Feeding Babies and Their Families

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Feeding Babies and Their Families

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This baby is the ten-month-old daughter of Charles—the man who, as a three-year-old, 20-pound boy with anemia, rickets, and intestinal obstruction, was cured *entirely* by diet, fresh air, and sunshine. (See page 5.)

Feeding Babies and Their Families

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THIRD PRINTING, SEPTEMBER, 1947

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CFTRI-MYSORE
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Feeding babies a

PRINTED IN THE UNITED STATES OF AMERICA

PREFACE

This book is the result of years of experience in feeding mother and child from before the birth of the baby through his adulthood; in helping thousands of mothers with their family problems of nutrition; and in teaching family nutrition. It is hoped, therefore, that the book will be valuable not only as a textbook for college students of family nutrition, but also as a guide for intelligent mothers in bringing up their families. We shall welcome suggestions from any of these students and mothers as the book is used.

The authors are extremely grateful to all who have helped with the manuscript by critical reading and constructive suggestions. It has been read and criticized either totally or in part by Dean Carl E. Ladd of the College of Agriculture, Cornell University; Miss Wylle B. McNeal, Chief of the Division of Home Economics, University of Minnesota; Dr. Flora Rose, Professor of Home Economics, Emeritus; and Dean Sarah Gibson Blanding of the College of Home Economics, Cornell University; as well as by many mothers and several fathers, and by graduate students and faculty of the College of Home Economics, Cornell University.

H. M.
M. K. H.

Cornell University
April, 1943

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CHAPTER I

WHY EAT?

Contents

A. Proper Food and Health Habits Make a Difference
B. Why We Eat What We Eat
C. Why Some Countries' Diets Are Deficient

Proper Food and Health Habits Make a Difference

THE babies of today are the men and women of tomorrow. Their health and happiness lie in the hands of the adults who care for them. Intelligence in feeding is largely responsible for their present and future health as well as for that of the parents. With the modern trend toward refining and fortifying natural foods it is more important than ever to know the simple guides to proper feeding.

Put yourself to the test—Do you know why you eat what you eat? Why you cook it as you do? What it does for you? Do you know what is lacking in your diet?

Figure 1 is Bobby. Bobby was brought to the College of Home Economics when approximately 2 months old, weighing 6 pounds. He was what the doctors called a typical marasmic (starving) baby. When he was taken into the Homemaking Apartment at Cornell, where students learn to do household tasks, including the care of a baby, many people said, "Don't take that baby. He will die on your hands and think what that will mean to the College." But we had faith in proper care and feeding. Bobby did not die, but at 10 months of age, looking as shown in Fig. 2, he was adopted by a childless couple. We did not stop to think what this meant to the College, but we know what it meant to Bobby.

Bobby is not exceptional. There have been thousands of Bobbys in the world who have responded to good care and feeding just as there have been other thousands who have responded to poor feeding.

Several decades ago many children looked like those in Fig. 3. In fact, some parents seemed to enjoy having a delicate child. It was not unusual to find Mrs. Jones talking over the back fence with Mrs. Smith and saying, "I don't believe we will ever raise our Lilly; she is so frail."

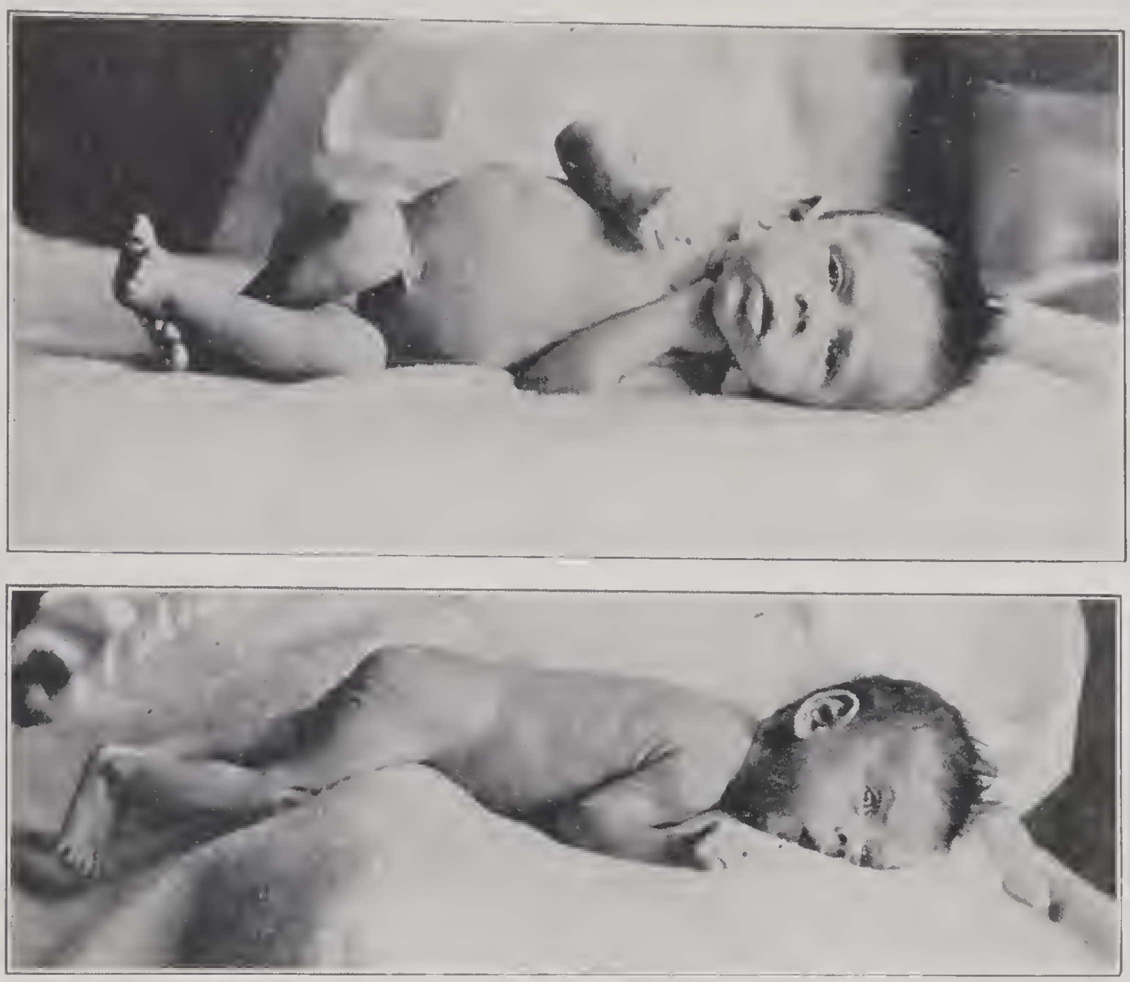

Fig. 1. Bobby. These pictures were taken when Bobby entered the Practice House at two months of age weighing 6 pounds. This was 2 pounds less than his birth weight (8 pounds).

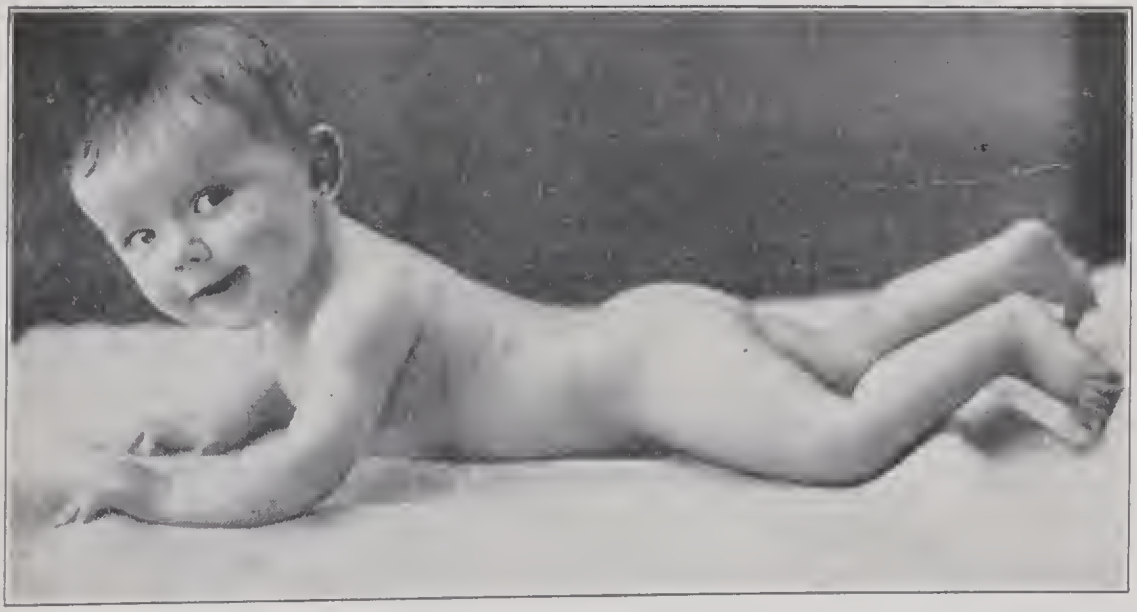

Fig. 2. Bobby after eight months of good nutrition.

Both Lilly and Mrs. Jones placidly accepted that frailness. No thought was given to the fact that food could make a difference. Today this is changed and children enjoy and have pride in being well and strong, and it is not unusual for parents to feel chagrined over delicate children.

The beautiful children shown in Fig. 4 are the result of a good home environment in which food, play, fresh air, sunshine, sleep, and clothing were all well suited to the children's needs.

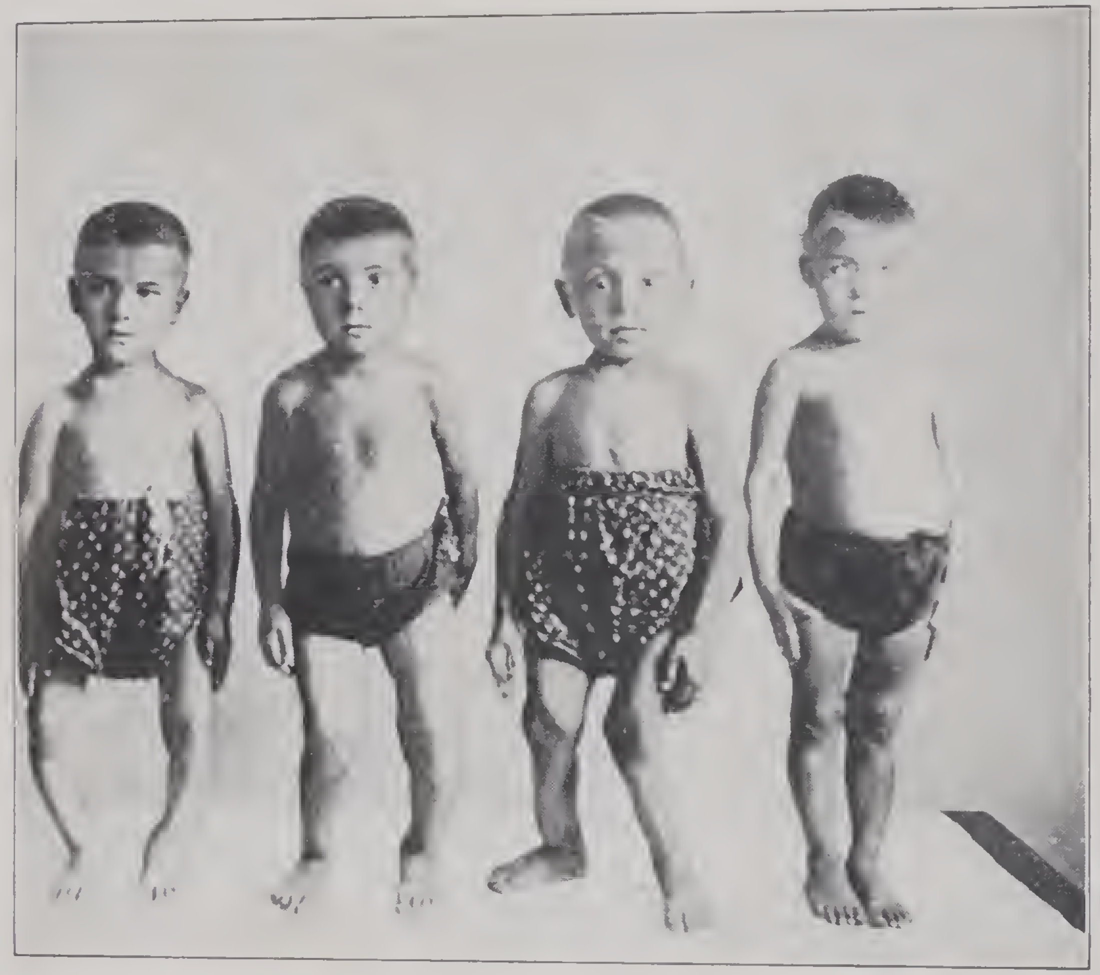

Fig. 3. Four seven-year-old European children stunted and deformed by deficient diets during World War I. Adapted from "War Babies," Extension Service, U. S. Dept. Agr.

Charles is another example where food made a difference. Figure 5 pictures Charles one year after his diet was corrected, and Fig. 6 shows Charles as a grown man.

Charles, when first brought to Cornell in April, 1920, was the most pathetic-looking child one can imagine. His head was large in proportion to his body, and his little arms and legs stuck out like wooden pegs. He was pale and listless, sat only with support, and could not stand or walk. He weighed but 20 pounds though he was 3 years of age. He looked at people from big, watery eyes with dark circles under them. One would not generally talk about a three-year-old in his presence, but this baby (for he was only a baby in development) was so apathetic that we realized he was barely conscious of his surroundings. Therefore he sat upon his mother's lap while we learned his life's story from her. Charles had not been able to keep down his food; he vomited daily and had a bowel movement only with the help of an enema.

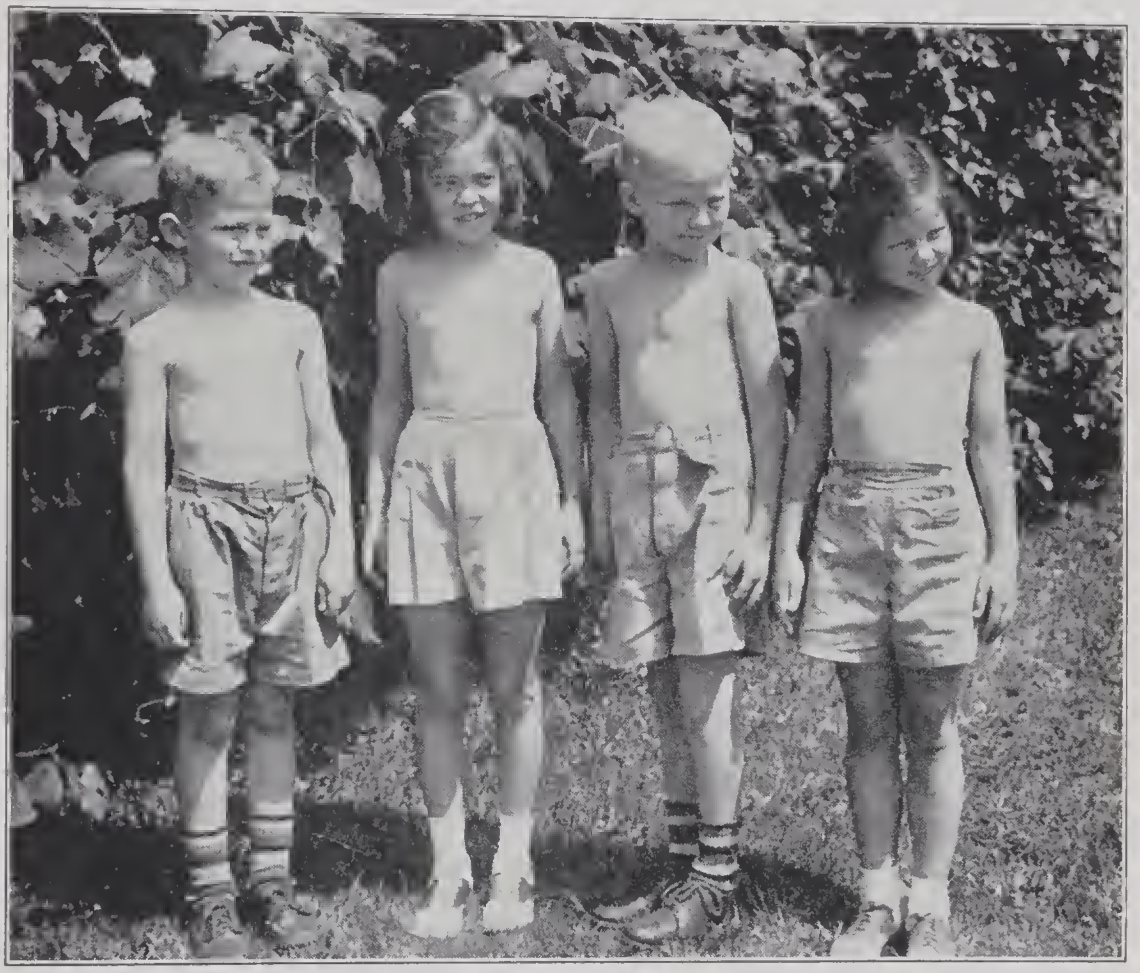

FIG. 4. Four well-fed, seven-year-old American children during World War II.

The doctor's examination reported a bad case of malnutrition; incipient rickets, as shown by beaded ribs, distended abdomen, abnormally large, square head, enlarged bones at ankles and wrists; secondary anemia; and probably distended colon. An x-ray, taken the second day, showed the colon constricted in one place, causing distention just above it. The roughage in Charles' diet could get down only as far as the constriction and could not pass beyond it. Thus food held in this part of the intestine would ferment—the colon would distend as far as it could and, when it could distend no further, food would come up; hence the repeated vomiting. Not enough food, apparently, was digested to nourish the child adequately and not enough food went through the small aperture to cause a bowel movement.

One difficulty was that Charles was being given the kind of food which would be given to a normal three-year-old. Although he was 3 years of age, his physical development was less than that of a one-year-old baby. He should have been fed according to his physical development rather than his age.

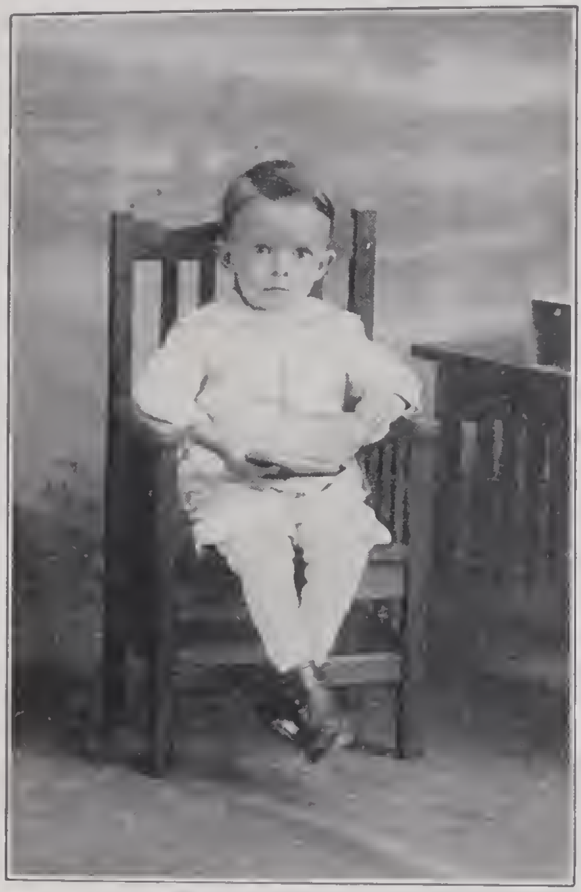

FIG. 5. Charles one year after treatment with proper food.

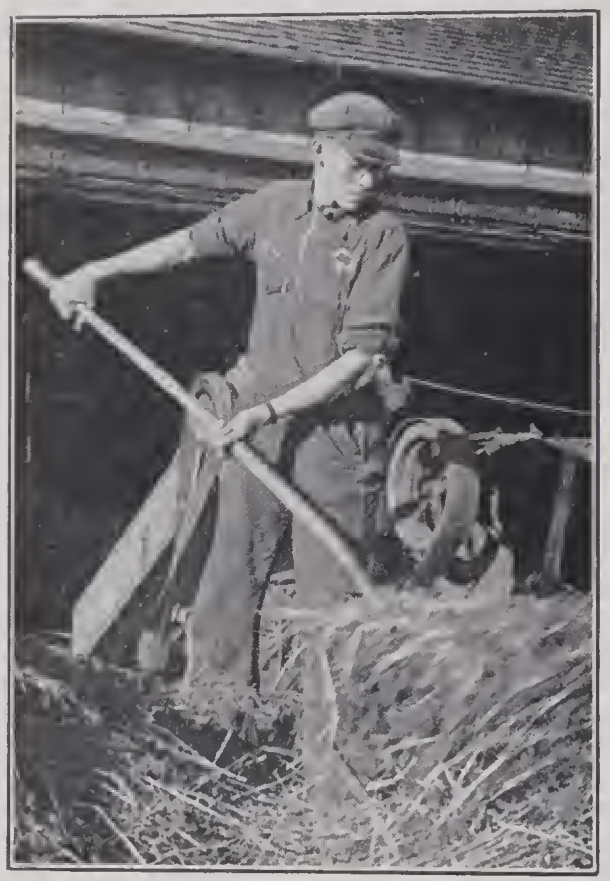

FIG. 6. Charles grew to be a healthy adult, who as a farmer does the threshing for himself and neighbors.

Charles and his mother were kept at the College for 9 days, during which time the mother learned what to feed Charles and how to get him to eat it. At the end of that period he was taken home. His mother thereafter sent to the College weekly reports of the child's progress for 2 years.

To overcome Charles' difficulties he was given a building-up diet with special emphasis on foods containing iron, calcium, and phosphorus, a diet that would not cause too much gas from either fermentation or putrefaction. This diet consisted of milk, egg, fruit juices, strained cooked vegetables, fruit sauce, well-cooked cereal with no sugar, and toast. Glycerin suppositories were used as necessary until the diet had a chance to remedy the bowel condition.

The mother's report for the first week said that the child was greatly improved even in that brief time. He showed no further indigestion and had had a normal bowel movement every day except one, when a glycerin suppository had to be used. His color was better; he was more active and slept well.

After 2 years, the weekly records were discontinued. The child's color had improved, the rachitic rosary had disappeared, the pot belly had decreased decidedly, he was mentally and physically more active, there were few symptoms of indigestion or constipation, the eyes were brighter and the child was much more alert and more willing to make friends than before.

Charles has been checked at intervals since his childhood. When he was 9 years old he came to the College for observation. By then he presented a much different picture from when he first visited the nutrition department of the College. The winged shoulders and beaded ribs were gone, the pot belly had disappeared, and his head was in good proportion to the rest of his body. His color was fine and his eyes were bright. He enjoyed investigating various rooms at the College and was greatly interested in the experimental rats. In other words, Charles' physical development had caught up with his age in years.

Charles ate at the College cafeteria at noon, selected his own dinner, and ate it all. His dinner consisted of:

Broiled halibut
1 baked potato
1 serving of peas
1 lettuce salad
1 glass of milk
Ice cream
Cake

The following shows a comparison of Charles' height and weight with that of other so-called normal nine-year-old children.

Name	*Height*	*Weight*	*Sex*
Charles	49	50	boy
B.D.	50	50½	girl
R.F.	50	51	boy
F.S.	49	50	boy
M.L.	46	42½	girl

It seems remarkable that Charles should rank so well with other children of his age in height and weight when one realizes what a bad case of malnutrition he had at 3 years of age and how far below normal he was at that time.

Today, thanks to good nutrition and to his mother's good sense and cooperation, Charles is a normal, healthy individual doing his own farm work (Fig. 6). In fairness to nutritious food it should be said that Charles' condition was remedied without the use of mineral or vitamin concentrates.

These illustrations demonstrate that proper food makes a difference, and may be a controlling factor in promoting or retarding human development.

Why We Eat What We Eat

The nutritional question of every homemaker is, "What will my family eat for breakfast, dinner, and supper?" Family food habits are built around customs and traditions, religious beliefs, the likes and dislikes of the various members of the family, an understanding of food values and of food needs, and, finally, available foods and the amount of money the homemaker has to spend for foods.

Customs and Traditions

Many strange customs and superstitions have existed about food. A surprising number are still believed. Some are of ancient origin, and others are modern. They may influence the homemaker of today in planning her menus. Here are some of those most often quoted:

Do not eat cherries and milk at the same meal.
Citrus fruits, such as lemons, oranges, and grapefruit, cause acidosis.
Nursing mothers should not eat corn.
Eat only protein at one meal, carbohydrates at another, and fat at another.
Tomatoes are poison.
Do not eat fish and ice cream at the same meal.
Nursing mothers should not eat grapefruit.
Do not eat pork.
Do not eat tomatoes and milk at the same meal.
Cheese is indigestible.

Some of these beliefs may have had a logical reason behind them when they were formed, but today we can find no factual foundation for believing any of them.

To illustrate the persistence with which they linger in the uninformed mind, these episodes are cited:

Three young children, two nutritionists, and a physician, on an automobile trip, stopped in a tea room for luncheon. The children were allowed to select their own food. The five-year-old boy's selection included tomatoes and milk. The waitress was horrified and said, "Oh, you must not eat tomatoes and milk at the same meal—they will kill you." The child turned with wide-open eyes to the nutritionist responsible for his upbringing. "Bring them to him, please," she said to the waitress, and then turning to the other adults in the party she remarked, "It's a good joke on us, a doctor and two nutritionists, and yet a waitress in a tea room tries to tell us what to feed our children." This same nutritionist remarked recently, "I wish I knew where to find that waitress to show her the healthy corpse—now a fine-looking, well-developed research worker." Poor food habits may result from a waitress' making such remarks when many of the customers may not have sufficient knowledge to judge nutritional values for themselves.

Recently a superintendent of a home for women refused to give them grapefruit, available to the institution on the surplus commodity list, "because," as he said, "they will cause acidosis." By refusing to let these women have grapefruit he may have been defeating his own aim since grapefruit is an alkaline-producing food. He was depriving these women of one of their best sources of vitamin C as well.

Traditions and customs are passed on from one generation to another. People tend to use foods which were common in their home land, even after migrating to another country. When some of the accustomed foods are missing, the diet may become badly unbalanced. Favorite dishes are handed down from mother to daughter; therefore the familiar remark: "The kind mother used to make."

One homemaker always cut a ham in two before boiling it. When asked why, she said because her mother always had. The mother was asked the same question, and she replied that it was because her mother always did. The grandmother was questioned as to the reason and said she cut a whole ham before boiling it because she did not have a kettle large enough to hold a whole ham.

Certain foods have also become traditional in some sections of the country. Baked beans and brown bread were commonly used for Saturday night supper in New England early in colonial days. The proteins of whole cereals used in the brown bread and served with the baked beans supplemented each other, tending to make more complete proteins. Combination of plant foods comparatively rich in proteins probably needed consideration by these people because of the scarcity of animal products. Thus tradition often supplied valuable and frequently scarce elements without people knowing of their importance in a balanced diet. When a certain element is low in a diet, people often crave foods containing it even though they know nothing of it or of its function. Natural instinct in this way may protect people somewhat against poor diets and has made helpful traditions. The tradition may continue long after the needed element is supplied in adequate amounts from new foods or after the people move to other areas.

In a part of China where milk, and hence calcium, is scarce, egg shells are dissolved in rice vinegar and used as a tonic. A student from Bulgaria says a whole egg, including the shell, is covered with lemon juice for 30 days, during which time the shell dissolves, and the mixture is then beaten up and given to pregnant women and to children. She did not know why, for they had plenty of milk in Bulgaria. A friend tells us that egg prepared in this way has been used in the United States. She recalls that years ago an aunt had it prescribed by a doctor as a cure for poison ivy. Again no one knows just why. Bones are also used as food in many countries. They are cooked in acid to dissolve the calcium. An example of this usage in this country is *Hasenpfeffer,* a rabbit covered with spice and vinegar and allowed to stand weeks or even months before cooking. Pickled pigs' feet, where the bone and the meat are used, and *Sauerbraten,* if the bone is used, exemplify the use of calcium from bone. People on low incomes might well utilize these as additional sources of calcium.

One missionary from a country where milk is very scarce asked if elephant bones would do and was told, "Certainly, the bigger the better." In our country where cheese and milk are plentiful, bones and egg shells are not commonly used and need not be.

The ash of burned sponges was used for goiter as early as the thirteenth century. It was not discovered until years later that the iodine present in the ash was the beneficial factor.

Religious Belief

Religion plays a part in the selection of food in many families. Probably all the religious laws regarding food had some definite goal at the time of their formulation.

Although times have changed, some of the rules made in bygone days are still good practice. To serve seafood once a week is a habit worth continuing regardless of religious belief. Refrigeration and freezing of foods have made it possible to have fish any day of the week. It is easier to form the habit, however, if it is served the same day each week irrespective of religious belief. Seafood is a good source of iodine and of complete protein, and the fat fish is a good source also of the fat-soluble vitamins A and D.

The custom of omitting pork from the diet was undoubtedly made to prevent trichinosis. At least it originated in a country where trichinosis apparently was common. Pork, even today, must be thoroughly cooked to prevent this disease, for recent reports show that one out of every four persons in the United States has trichinosis. Pork, however, should not be left out of the diet as it is an excellent source of thiamin (vitamin B_1) and complete protein. It is not eating pork that is undesirable but eating incompletely cooked pork.

Food Likes and Dislikes

In addition to traditions, customs, and religious beliefs many individuals have food notions peculiar to themselves. Some may be true and others imaginary. "I cannot eat cabbage"; "Apples do not agree with me"; "My child does not tolerate eggs." Such remarks are very common. Certain people may be allergic to certain foods. It is also true that food dislikes are all too common. One may tire of a food. Lack of variety in the diet and poor preparation often cause food dislikes, and too much of any food may cause allergy. Most of these difficulties can be overcome.

A pre-school child who had become tired of tomatoes by the end of the tomato season said, "I don't like tomatoes." They were omitted from her diet for some time, and later when offered to her in small amounts she ate them willingly. One day at nursery school when served tomatoes she laughed and said to an adult, "Remember when I didn't like tomatoes?"

Available Foods

Most homemakers are influenced by the products raised locally. This is closely related to the economic problem since food which is scarce or out of season is, for most people, a luxury. Locally grown foods which are plentiful and relatively inexpensive should be served frequently. In fact, where even a small amount of land is available it may show good judgment to produce some food, for experimental work has shown that the longer food stands after picking the greater the loss of vitamin C. Also, those of us who have our own gardens realize that freshly picked food has a superior flavor.

The Money We Have To Spend

The homemaker must answer the food problem within the limits of her own pocketbook. In normal times the income of most of the people in the United States is sufficient to feed the family properly. There is evidence, however, that less than one-half the population is properly nourished according to present-day standards of feeding. [1] [1]

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[1] Numbers in brackets refer to references at the end of the chapter.

The nutritional picture (Fig. 7) would appear poorer had all city families been included. Families receiving relief and those with an annual income under $500 were not included in this study. For explanation of good, fair, and poor diets as used in this study, see page 285.

The financial problem is an important one, but the homemaker should also answer her family food problem on a basis of food values. Nutritious food may be less expensive than poorly selected, more expensive foods and over a period of time may save in doctors' bills. Homemakers who fail to feed their families properly may do so not only because of thin purses but also because of "thin" knowledge of nutrition and a failure to appreciate fully the importance of the problem. Every homemaker and mother should be aware of the nutritional condition of her family and should realize how food builds and repairs the body and how it affects the mental and physical condition of each member of her family. She will be willing to spend more time planning the family meals if she understands the great return in the health of her family. Many minor ailments such as fleeting pains in joints, night-blindness, ear trouble, digestive upsets, neuritis, bleeding gums, bad teeth, lesions of lips at corners of the mouth, as well as the more serious diseases such as rickets, anemia, xerophthalmia, scurvy, and pellagra, are attributable to the lack of one or more essential nutrients in the diet.

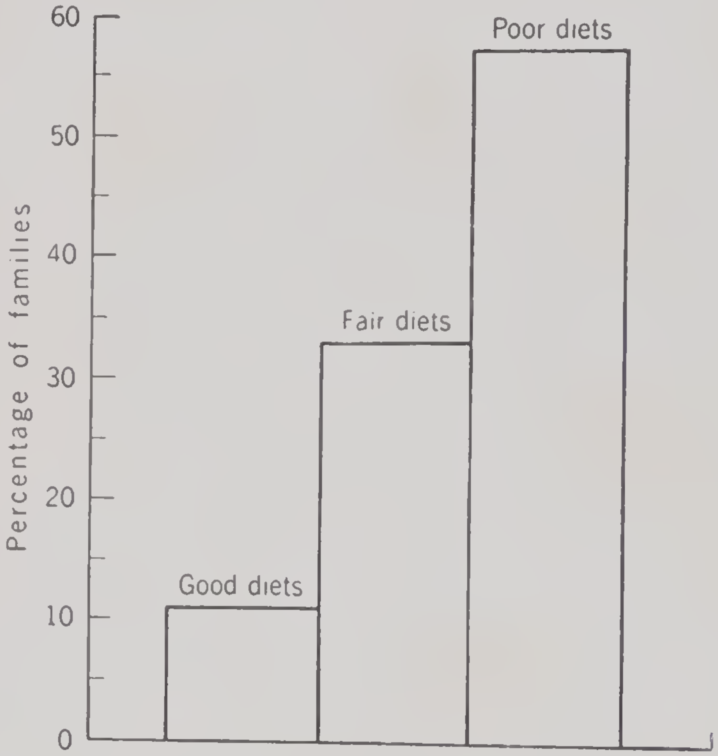


FIG. 7. Adequacy of diets purchased by city workers, North Atlantic States. Source of basic data: *Diets of Families of Employed Wage Earners in Cities,* by Stiebeling and Phipard, 1939.

Why Some Countries' Diets Are Deficient

Nations may have deficient diets because of a general condition of low income, ignorance of nutrition, poor food habits, or food shortages. When low incomes and lack of knowledge are combined with shortages of important foods, serious diet deficiencies result. In the past, with more acute shortages of food, malnutrition was certainly more excusable than today, but in some parts of the world problems of food shortage still remain.

In Russia in the famine of 1898, many people suffered from scurvy, influenza, and diarrhea. The children had rickets, skin eruptions, and inflammation of the eyes. [2] Growing children are usually more seriously affected by these food deficiencies than adults.

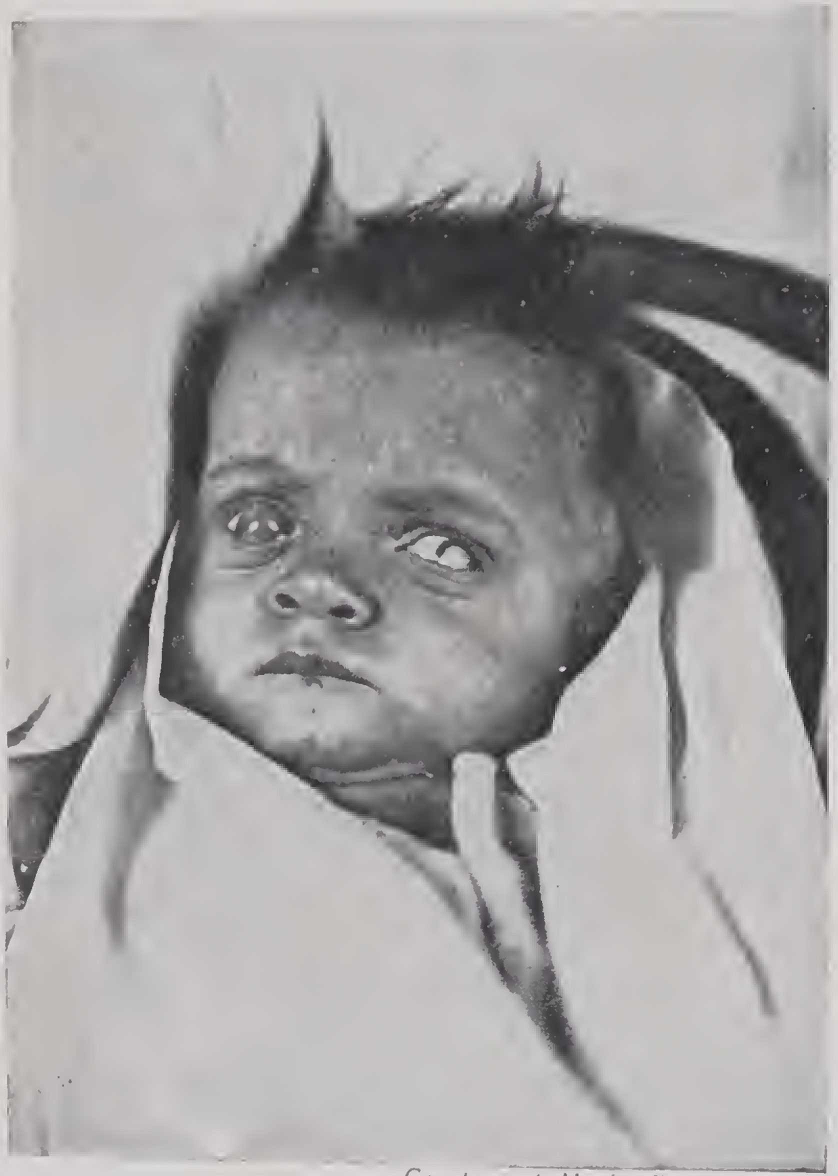
The food shortage caused in European countries by the World War of 1918 left many evidences of nutritional deficiencies. Children in particular showed signs of malnutrition by underweight, rickets, scurvy, dull hair, and even the expression on the face told the story of insufficient food. (See Fig. 3.)

Figure 8 shows a Danish baby suffering from xerophthalmia. The disease had progressed so far before treatment that sight of the left eye was destroyed. [3] During the years 1912–16 about 50 cases of xerophthalmia were studied in Copenhagen. Most of the cases were under one year of age. These infants had been given skim milk, practically free from fat. They had sold away the eyesight of their children in butter. Lack of fat in the diet was pronounced the cause of the eye trouble, because it could be relieved by giving cod-liver oil, whole milk, or cream mixtures. Later the disease was recognized as vitamin A deficiency.

Today in China mothers sometimes nurse their babies 2, 3, 4, 5 years, or even longer because of the scarcity of other milk. By so doing the mothers frequently develop osteomalacia (a softening of the bones of the body). If they could all be given the egg shell dissolved in lemon or other acid (see page 9) or meat bones cooked in acid, as some are, this condition might be remedied.

The food habits of people, which in many cases have been formed because of the foods that are common in that particular locality, tend to leave their mark on whole populations. The natives of India living in the north have a diet principally of whole wheat, milk, legumes, vegetables, and some meat, and they have been described as stalwart races. Those living in the south, having a diet largely of polished rice, some legumes, vegetables, and fruits, but little or no milk and meat, have been described as "toneless and poorly developed." [4]

The diets of two tribes in Kenya, Africa, showed definite effects of food on health and physique. The Masai ate mostly milk, meat, and raw blood; the Akikuyu, mostly cereals, roots, and fruits. The average Masai was 5 inches taller and 23 pounds heavier than the average Akikuyu, and had 50 per cent greater strength. Constipation and arthritis were more common among the Masai tribe and showed the need for more fruits and vegetables. The defects common to the Akikuyu were bone deformities, decayed teeth, anemia, lung disease, and tropical ulcer, showing the need for more meat, green vegetables, and milk. [5] Neither diet was good.



Courtesy of Mosby Publishing Co.

FIG. 8. Xerophthalmia, the result of a diet deficient in vitamin A. From *Infant Nutrition* by Marriot and Jeans.

Two children of Philippine parentage have come under our supervision for feeding. The parents were small but the children were the size of the average American children by the time they were 1 and 2 years of age. These children showed other symptoms of good nutrition. Height and weight alone should not be used to judge good nutrition. (See Chapter II for other symptoms of good nutrition.)

The United States, also, has serious dietary problems. We think of our country as a land of plenty. We have not only an abundance of food but also a great variety. Although practically all our population could be well nourished, many studies show that an unbelievable proportion of our people, even those with adequate income, is poorly or only fairly well fed.

Table 1. Grade of Diet Purchased by Families Spending $2.50 per Person per Week for Food

Race and Area	Grade of Diet		
	Good	Fair	Poor
	percentage of families in the area		
White			
North Atlantic	5	22	73
East North Central	6	26	68
East South Central	32	31	37
Pacific	10	43	47
Negro			
South	14	26	60

Source of data: Stiebeling and Phipard, *Diets of Families of Employed Wage Earners and Clerical Workers in Cities*, 1939. U. S. Dept. Agr. Circular 507.

It will be noted that in the East South Central region 32 per cent, almost one-third, of the diets were graded good, and 37 per cent poor. This means that two out of three families were not well nourished. If in this section of the United States one-third of the people could get good diets there seems to be little reason why the people in the other areas could not do as well or better. This reflects an inability on the part of many homemakers to spend their money wisely.

It is also possible that part of our difficulties arise because man has learned both to refine and to reinforce foods, thus increasing the probability of unbalanced diets. The problem is primarily one of knowledge and an ability to make that knowledge function.

The aim of this book is to stimulate interest in finding the answers to questions like these:

1. What effect will adequate food have upon me, my husband, and my children?

2. What diets are adequate for obtaining and maintaining good nutrition?
3. What may we expect to happen if the diet lacks some of the essentials?
4. How can I improve the diet, thereby improving my family's health, and still keep within my food budget?

REFERENCES

1. H. K. Stiebeling and E. F. Phipard, *Diets of Families of Employed Wage Earners and Clerical Workers in Cities,* U. S. Dept. Agr. Circular 507, U. S. Govt. Printing Office (January, 1939).
2. E. Parmalee Prentiss, *Hunger and History,* Harper and Brothers, New York (1939).
3. E. V. McCollum and N. Simmonds, *Newer Knowledge of Nutrition,* 3d Ed., Macmillan, New York (1927).
4. R. McCarrison, "Problems of Nutrition in India," *Nutr. Abst. & Rev.,* Vol. 2, pages 1–8 (1932).
5. M. S. Chaney and M. Ahlborn, *Nutrition,* Rev. Ed. (page 362), Houghton Mifflin, Boston (1939).

CHAPTER II

THE NEWLY-WEDS FEED THEMSELVES

Contents

A. The Newly-Weds Learn Nutrition
B. The Newly-Weds' Food Problem
C. The Newly-Weds Practice Nutrition

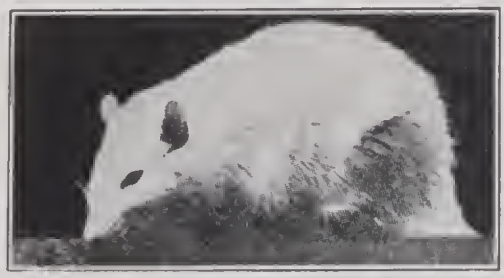
FIG. 1.

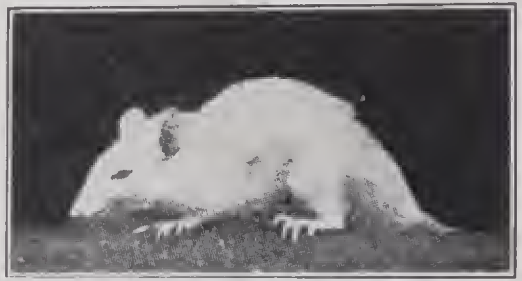
The Newly-Weds Learn Nutrition

PROPER feeding of adults is important to the future health and well-being of the family. A good physical condition is important for man and wife, and each should understand the place of foods in obtaining and maintaining this condition. Foods are essential to the individual, to his matrimonial partner, and to the family that is to come.

It is commonly said that the way to a man's heart is through his stomach. This is usually interpreted that one must be a good cook, but food selection is also very important.

McCarrison's study of two groups of white rats shows the effect of food on disposition. One group was fed a diet similar to that of a northern Indian race whose physique and health were good. The diet consisted of freshly ground whole-wheat flour made into cakes of unleavened bread, milk, and the products of milk (butter, curds, buttermilk), pulses (peas, beans, lentils), fresh green leaf vegetables, root vegetables (potatoes, carrots), and fruit, with meat and bone occasionally. The other group was fed on a diet commonly followed by many people in England. The diet consisted of white bread and margarine, tinned meat, vegetables boiled with soda, cheap tinned jam, tea, sugar, and a little milk—a diet which does not contain enough milk, milk products, green leaf vegetables, and whole-meal bread for proper nutrition. The group fed on the good diet lived happily together, they grew well (Fig. 2), and there was little disease among them. The group on the poor diet lived unhappily together, they did not grow well (Fig. 3), and many became ill. By the sixtieth day of the experiment the stronger ones of this group began to kill and eat the weaker ones, and so they had to be separated. These rats suffered from diseases of the lungs, of the stomach and intestines, and of the nerves. According to McCarrison these are diseases from which one in every three sick persons among the insured classes in England and Wales suffers. [1]





Courtesy of Sir Robert McCarrison

FIG. 2. (Left) Rat fed from an early age on a good diet consisting of whole-wheat bread, butter, milk, pulses (peas, beans, and lentils), fresh green vegetables, and carrots, with a ration of meat and bone once a week. (Compare with Fig. 3.)

FIG. 3. (Right) Rat, of the same age as that in Fig. 2, fed from the same early age on a bad diet consisting of white bread and margarine, tinned meat, vegetables boiled with soda, tinned jam, tea, sugar, and a little milk.

Not only these illnesses but also much back-biting of human beings may be attributed to poor food selection. Some nutritionists today say that many quarrels and divorces are the result of poor nutrition.

The solution of the feeding problem is left mainly to the wife and mother. If she is to do the best possible job, there are certain facts about food and its characteristic effects on human nutrition which she should know. She should also be able to recognize symptoms of nutrition in individuals which will help her judge the results of a balanced diet. If she starts as a newly-wed with constant critical analysis of herself and her husband in relation to their feeding, it will have become second nature by the time the family arrives.

The bride will find it helpful if she and her husband discuss their physical condition in relation to their food habits. Likes and dislikes can be changed. They are matters of home training or food habits.

Some school children in a poor section in Chicago were given bread and butter sandwiches. The children did not like them because they were in the habit of eating lard on their bread.

There was also the child from the city who went to the country for a visit. Upon his return home he asked for eggs. The eggs on the farm, he explained, had no flavor.

Even adults can learn to like different foods. Grapefruit, honeydew melon, broccoli, Chinese cabbage, and avocado pears have been on the market a relatively short time, and yet most of us have learned to like them. Those who have traveled in regions where different foods were served frequently have liked them so much that they carried the recipes back to their homes. That may be the reason for the popularity of foreign cookbooks. Many foreigners coming to this country have never tasted cow's milk; if they had milk in their country it was likely to be goat's milk. Yet often even adults learn to like cow's milk.

Frequently adults have formed a prejudice for a certain food, but if it is served under a different name it is liked. One of the writers recalls serving chicken salad made of veal to a man who would not eat veal in any form. He not only ate the salad but remarked, "This is the best chicken salad I ever ate."

The story is also told of a woman who did not like lamb. She had eaten what she called a delicious "meat pie." Her husband told her it was lamb and she replied, "Oh, no, it wasn't. You know I never eat lamb." The husband telephoned the hostess to prove that the pie was made of lamb.

Jack, aged 13, was having dinner with friends. Tomato salad was served with the meal. When the plates were removed for the dessert, Jack's salad was untouched. The hostess said, "Taste the salad, Jack. If you taste a food you do not like every time it is served, you will soon learn to like it." Jack tasted the salad. Several months later he had a friend his age visiting him; when cabbage salad was served, the friend said, "I don't like cabbage salad." Jack said, "Oh, taste it, Timmy, I didn't use to like tomato salad but when I was at Miss Smith's for dinner several months ago she told me to taste it and now I like it."

Eating should be a pleasurable process. The newly-weds, however, should form their food habits with consideration as to what is best for them, for the food we eat directly affects our physical and mental well-being.

Food As a Factor in Good Health

Well-selected food gives human beings, like animals, a much better chance of living healthy and happy lives. If, on the other hand, there is a deficiency in any one or several of the essentials, we may expect physical as well as mental disturbances. Some of the most common are indigestion, constipation, diarrhea, eye trouble, defective teeth, bleeding gums or Vincent's disease, chapped lips, sores at the corners of the mouth, and bowlegs. The difficulties may be of only minor importance, or they may be so serious as to lead to incapacity, severe pain, or even death.

Experimental work has shown that human beings need food for three general purposes: (1) energy, (2) building and maintenance of body tissues, and (3) regulating the normal, healthy functioning of that wonderful machine called the human body.

Foods are complex substances. All natural foods, for example, contain several or all of the substances known as proteins, fats, carbohydrates, water, mineral matter, and vitamins, and hence all serve more or less all three purposes—energy, building, and regulating. Even egg white, perhaps our purest natural food, contains some mineral matter, water, and vitamins besides protein, and hence serves all three purposes. It is only when man tampers with food that it is likely to serve but one purpose, as cornstarch, white sugar, and some unfortified commercial fats which give energy only. Furthermore, each of these foodstuffs—proteins, fats, carbohydrates, minerals, water, and vitamins—plays at least a dual role in nutrition. Thus protein builds muscle tissue, gives energy, and may help with the regulation of body functions. Calcium, a mineral, helps build bone and teeth and regulates muscle and nerve action. Vitamin A helps build pigment, the epithelial tissue of the eye, and the epithelial tissue of the respiratory organs, and helps furnish resistance to infections. Hence it is difficult to discuss without repetition foods under the headings of energy foods, building foods, and regulating foods. However, for simplicity, after a discussion of energy foods, each of the foodstuffs—protein, mineral, vitamins, and water—will be taken up separately.

Energy

Energy food is necessary to maintain body heat and furnish fuel for work and play. Energy is measured in terms of "calories," just as cloth is measured by the yard. The term calorie as used here represents the amount of heat necessary to raise 1 kilogram, 2.2 pounds, of water 1 degree centigrade, or 2.12 degrees Fahrenheit. It is calculated with a calorimeter. The energy value of food is really, therefore, a quantitative measure, and hence a discussion of it comes logically before the discussion on the quality of foods.

Energy Requirement

Energy requirement is an important consideration in nutrition, but for most people it does not deserve as much attention as has been given to it in the past. Generally it is more important to consider first the other factors of the diet, including the building and regulating materials—protein, minerals, and vitamins. If these other needs are adequately supplied by natural foods, there is little chance of either a lack or an oversupply of calories, especially for adults.

The amount of energy food needed is dependent largely upon physical activity and body build. Internal activity as well as external activity requires energy. When a person is at rest, energy is needed to keep the body heat normal and to carry on the work of the internal organs. This minimum amount of energy needed when the body is at rest 12 to 14 hours after food has been consumed is called our basal metabolism and varies with individuals. Tall thin individuals require relatively more energy than short stocky ones since body surface is greater in relation to weight and more heat is lost to external air. Our total energy requirement is that which is needed for basal metabolism, the digestion and assimilation of food, and external activity. The amount of energy expended for a given activity varies with individuals. For example, the amount of energy Sonja Henie would spend skating would be less per hour than that of a beginner. Energy food taken in excess of these requirements is stored as fat. In general, growing children, especially active adolescents, need a higher proportion of energy foods than do adults. But for children, as for adults, the building and regulating materials—protein, mineral, and vitamin needs of the body should be met first and then the diet filled in with additional high-quality, nutritious energy foods (Table 1). Technically one's energy requirement is figured in terms of calories. It is simpler, however, to check your weight. If an adult's weight is up to standard, the calorie requirement is being satisfactorily met.

Energy Foods

The energy foods include (1) fats and oils, a pound of which gives two and one-quarter times as much energy as a pound of any other food; (2) carbohydrates—starches and sugars; and (3) the proteins, found in meat, milk, eggs, cheese, and beans, which furnish as much energy as carbohydrates but are usually expensive to use for this purpose.

If you are eating foods for energy only and trying to be economical, use carbohydrates since they are our cheapest source of energy. Fats would come second from the standpoint of cost, and proteins third. If you are selecting energy foods from the standpoint of palatability only, most fats and the animal proteins would rate high. People usually enjoy the flavor of butter, cream, beef, and bacon. Consequently, as one's standard of living rises, the consumption of such foods usually rises rapidly because of their palatability, which is due to texture and flavor.

When selecting energy foods consider what the food gives besides calories. Two tablespoons of white sugar supply the body with 100 calories and give no other food value. On the other hand, 1½ tablespoons of cane molasses give 100 calories of energy, also over one-tenth of our daily calcium requirement (to help build bones and teeth) and nearly one-fifth of our daily iron requirement (so necessary for hemoglobin, the coloring matter of blood). This is important, for these two minerals are often low in the American diet. It takes approximately 3 tablespoons of brown sugar to supply 100 calories, but we get calcium and iron in addition to the calories. Likewise ¼ cup of white flour gives 100 calories, but if whole wheat flour is used it supplies iron, vitamin B_1 (thiamin), and riboflavin in addition to calories. Potatoes are sometimes thought of as supplying energy only. However, potatoes are a good source of thiamin, vitamin C, riboflavin, and iron as well as of energy. In fact our early knowledge of vitamin C disclosed that scurvy was commonly associated with potato famine in certain countries. The foods used as substitutes for potatoes, such as polished rice, macaroni, spaghetti, and noodles, may contribute, as manufactured at present, little other than calories. Use them occasionally for variety but remember that potatoes are a more nutritious food than these substitutes. Table 1 will help you select calorie-high foods which will supply vitamins and minerals as well as calories.

As we mentioned above, fats give us pound for pound two and one-fourth times as many calories as other foods. Fats tend to give us a satisfied feeling for a longer period of time because they digest more slowly than other foods and are therefore retained in the stomach for a longer period. We "feel full" for a longer time if we eat bacon and eggs for breakfast than if we eat toast or cereal with little or no fat. Hence too much fat in the diet may be the cause of poor appetite, especially in children. Perhaps more fat might prove beneficial for the farmer and all who work hard physically and may feel hungry before meal time.

The proportion of calories received from the various groups of food differs between countries. Americans consume about 60 per cent of their calories from the carbohydrates (starches and sugars), about 30 per cent from fats, and about 10 per cent from protein. The Eskimos eat a diet high in protein and fat.

Table 1. Foods High in Calories

Preferred Sources These Calorie-High Foods Have Appreciable Amounts of Vitamins and Minerals		Sources To be Used Sparingly These Foods Have Little Besides Calories	
Food	Approximate 100-calorie portions	Food	Approximate 100-calorie portions
Butter	1 tbsp	Margarines, unfortified	1 tbsp
Cod-liver oil	1 tbsp	Olive oil	1 tbsp
Halibut-liver oil	1 tbsp	Bacon (uncooked)	1 medium slice
Peanut butter	1 tbsp (rounded)	Lard	1 tbsp
Cane molasses	1½ tbsp	Sugar, white	2 tbsp
Sugar, brown	3 tbsp	Lollypops	2–2″ dia.
Maple syrup	1½ tbsp		
Oatmeal or flaked wheat	4 tbsp uncooked	Cream of Wheat (unfortified)	3 tbsp
Steel-cut oats or whole wheat	4 tbsp	Hominy, white	3 tbsp
Cornmeal, yellow	3 tbsp	Cornstarch	3 tbsp
Shredded Wheat	1 biscuit	Rice, polished	2 tbsp uncooked
Rice, brown	2 tbsp		
Flour, whole-wheat	¼ cup	Flour, white unenriched	¼ cup
Bread, 100% whole-wheat	1⅓ medium slice	Bread, white	1⅓ medium slice
Potatoes	1 small	Macaroni, dry	¼ cup 1″ pieces
		Spaghetti, cooked	10 tbsp
		Noodles, cooked	¾ cup

Measurements level unless otherwise stated.
For abbreviations see Appendix.
For vitamin and mineral contents of foods see Appendix.

Effect of Excess or Deficiency of Calories

When more energy food is consumed than the body needs, the excess is stored as fat and we gain weight. Likewise, if more energy is needed than the food supplies, the body draws upon the stored fat and we lose weight.

Protein

Protein—derived from the Greek word *protos* meaning first—furnishes a large portion of the material from which muscle cells are built. Originally this term was applied to protein substances because scientists considered them of first importance. Today, however, with our advanced knowledge of nutrition we realize that no one food factor is first in importance. All are needed for a well-balanced diet. Protein, however, next to water, makes up the largest part of living tissue.

The need for protein as a building material is not limited to growing children, pregnant women, and people who are building new tissue after a wasting disease. Since the internal functioning of the body is continually wearing out tissue, protein is needed by every one for normal repair and maintenance. Protein, as mentioned previously, may also serve as a source of energy.

Protein Foods

The world commonly thinks of milk, eggs, cheese, beans, meat, and fish as pure proteins. They are not proteins but foods rich in proteins. Milk, for example, contains two proteins—casein, or the substance found in the curd of sour milk, and lactalbumin, the protein which goes into the whey. In digestion these two, like all proteins, break down into their component amino acids. Thus casein gives the following amino acids: alanine, arginine, aspartic acid, cystine, glutamic acid, glycine, histidine, hydroxyproline, hydroxyglutamic acid, leucine, isoleucine, lysine, phenylalanine, proline, serine, tryptophane, tyrosine, and valine.[1] All proteins are complex nitrogenous substances that break down into amino acids, which vary in kind and number with the protein.

To demonstrate what possibilities there are for variety in proteins, one needs to know that there are twenty-two different amino acids now known and probably others still undiscovered. We may think of these amino acids as building blocks. Different blocks serve different purposes in building our body just as different kinds of building material are needed in the construction of a house. The blocks are carried by the blood to the places where they are needed. Some of these building blocks apparently can be made by the body, but there are at least ten which must be supplied as such by the proteins in our diet.

The complete proteins are those containing the amino acids which cannot be synthesized adequately in the body for normal growth. The ten which cannot be thus made are arginine, histidine, isoleucine, leucine, lysine, methionine, phenylalanine, threonine, tryptophane, and valine. These ten amino acids which must be supplied by our foods are called "indispensable" or "nutritionally essential." Experiments with animals show that growth can take place in the absence of arginine but not at a normal rate. [2]

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[1] This list does not include the more recently discovered essential amino acids methionine and threonine, for they were not known when this analysis was made.

Incomplete proteins are incapable of maintaining life or supporting growth, when fed as the sole protein. Gelatin, for example, is an incomplete protein lacking tryptophane, tyrosine, and lysine. If a child or animal were given this or any other incomplete protein as its only source of protein, it would not grow.

Both the animal and plant kingdoms supply us with protein foods. The animal kingdom gives us milk, liver and other internal organs, meat, fish, eggs, and cheese. The proteins of each of these animal foods contain the ten building blocks with which we must supply our bodies to maintain life and provide for normal growth.

The plant kingdom supplies us with cereals, legumes, other vegetables, and nuts, but not all their proteins contain the ten essential buildings blocks. Therefore these proteins are called "incomplete." Body tissue cannot be built by any one of these alone. A combination of incomplete proteins can build body tissue but it is safer to include some animal protein. However, the proteins of the plant kingdom are well utilized by the body and are usually less expensive than animal proteins. A variety of plant foods is advised to insure a greater supply of amino acids, but each day's diet should include some foods from the animal proteins to insure the complete-protein group. Thus we commonly eat a complete or animal protein with our incomplete vegetable proteins, such as bread with milk or egg, cereal and milk, meat or fish and potatoes, and pork and beans.

Protein Requirement

The protein requirement of the body varies with individuals. One gram of protein per kilogram or 2.2 pounds of body weight is a good guide for an adult. This would figure 1 ounce of pure protein for every 68 pounds of body weight. Another way to figure the requirement is to state that 10 to 15 per cent of the day's total calories should be furnished by protein. Each gram of protein has been found to furnish the body 4 calories of energy. The largest part of the day's protein requirement would be met by including a pint of milk, an egg, a serving of meat or fish, nuts, legumes, or cheese (Table 2).

Table 2 shows two groups of protein foods. The expensive sources from the standpoint of money expenditure are on the left. Those on the right are relatively inexpensive. One must remember, however, in selecting food that some of the complete protein foods should be included in the daily

Table 2. Sources of Protein and Their Cost in 1939

Expensive Sources					Inexpensive Sources				
Food	One serving (quantity)	Protein content	Cost per 10 grams of protein *	Average retail price, 1939	Food	One serving (quantity)	Protein content	Cost per 10 grams of protein *	Average retail price, 1939
		grams	*cents*	*cents*			*grams*	*cents*	*cents*
Green peas,† canned	3/8 cup	4	4.82	13.8 #2 can	Navy beans †	1/8 cup	7	0.56	6.2 per lb
Egg	1 medium	7	4.00	32.6 doz	Rolled oats †	3 tbsp	4	0.98	7.1 per lb
Milk	1 cup	8	3.75	12.3 qt	Lima beans †	1/6 cup	5	1.11	8.9 per lb
Lamb chop (rib)	2 medium	28	3.70	36.1 per lb	Cottage cheese	5 tbsp	19	1.30	13.0 per lb
Round steak	4″ × 4″ × ½″	22	3.53	35.9 per lb	Pink salmon	½ cup	11	1.34	13.2 16 oz can
Liver, beef	3.5 oz.	20	2.93	26.8 per lb	American cheese	1⅛″ cube	7	1.77	24.8 per lb
Red salmon	½ cup	11	2.41	23.6 16-oz can	Mackerel	cross section 3½″ on back, 3½ oz	19	Cheap sources but price not given in data used	
Milk evap.	4½ tbsp	5	2.34	6.8 14½-oz can	Peanuts	6 oz or 20–24 peanuts	5		
					Liver, pork	3.5 oz	21		

* Ten grams of protein are one-seventh of the day's allowance for a 154-pound man. Prices used were average retail prices of foods in 51 combined cities in 1939. Key for abbreviations in the Appendix.

† These foods supply incomplete proteins, that is, do not supply all the amino acids needed by the body; therefore some of the animal foods which supply complete proteins should be included in each day's diet. For other sources of protein see Appendix.

diet. Those on the right, with the exception of cottage cheese, pink salmon, American cheese, mackerel, peanuts, and pork liver, are incomplete proteins. Cheap sources in many cases can be substituted to advantage for the expensive sources. Thus if the amount of money to be spent for food is limited, pork liver can be used in place of beef or calves' liver; pink salmon or mackerel in place of red salmon; American cheese in place of part of the milk; and dried lima, navy, or kidney beans in place of fresh, frozen, or canned peas. However, the fresh vegetable contributes more vitamins than the dried legumes.

When the body oxidizes or burns proteins, more calories are needed in the process than in the oxidation or burning of fats and carbohydrates. The increased heat produced from protein is due in part to the chemical stimulus received from the breaking down of some of the amino acids. This energy does not perform body work but heats the body and may eventually be given off as waste heat. This stimulation from food is called "specific dynamic action." [3] Fats and carbohydrates go through this same process but to a lesser degree. When the body has been maintained on stored fuel, as in fasting, and is changed to a diet of fats or carbohydrates the rise in calorie requirement due to oxidation has been found to be only about 2 per cent. When the change is to proteins the rise is about 20 per cent. This does not mean that the use of protein in the diet should be avoided but we should remember that a high protein intake gives more calories as waste heat and is expensive.

Effect of Excess or Deficiency of Protein

Protein in excess of the daily requirement apparently is not injurious to the body. When the body has used the supply needed for building, the remainder is used for fuel with the nitrogenous part being excreted. The body may burn excess protein for energy, but the sugars, starches, and fats are a more economical source of energy. We have often heard that a high protein diet causes rheumatism, hardening of the arteries, and damage to the kidneys since the nitrogenous waste products are excreted chiefly by the kidneys. Experiments with animals show that the kidney may increase in size when a high protein diet is consumed but goes back to its original size when the protein intake is reduced. [4]

While it is possible to consume a relatively high protein diet in winter we feel better in hot weather if we do not consume an excess of protein. This specific dynamic action is probably the reason why high protein diets have been successful in reducing weight. These diets frequently included two to three times the amount of protein now considered a normal allowance. Diets unusually high in protein are often deficient in other food essentials. [5] It is better to reduce weight by reducing the calories of a well-balanced diet. [6]

The Eskimos are an example of humans living on a very high protein diet and apparently having no difficulties. In fact a vigorous young tribesman may eat as much as nine pounds of meat a day when seals are plentiful. Eskimos, on the other hand, can stand a higher protein diet because of the extremely cold climate in which they live. The specific dynamic action of protein has real value for the Eskimo who needs to be kept warm.

Table 3. Some Good Sources of Protein

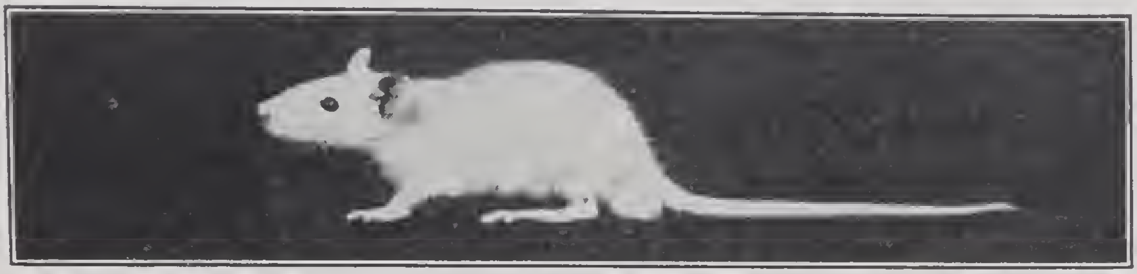
FOOD	MEASURE OF FOOD	PROTEIN GRAMS
Tuna fish, canned, without oil	½ cup	22
Beef, round, lean	1 slice 2½″ × 2½″ × ⅓″	21
Pork chop, loin	1 medium serving	20
Salmon, red, canned	½ cup	20
Liver, beef	1 slice 5″ × 2½″ × ¼″	20
Ham, smoked, lean	1 slice 4″ × 2½″ × 9/16″	20
Kidneys, veal	½ kidney 4¾″ long	17
Lamb chop, broiled	1 chop	14
Cheese, cottage	3 tbsp	12
Beans, baked, canned	½ cup	9
Milk, whole	1 cup	8
Milk, skim	1 cup	8
Peanuts, shelled, roasted	¼ cup	8
Cheese, American	1⅛″ cube	7
Egg	1 medium	7
Peanut butter	1 tbsp	5
Peas, green, fresh	¾ cup	5
Beans, lima, cooked	½ cup	5

The diet of native Eskimos is not meat alone. To be sure they do eat caribou meat and much fish (fresh, frozen, and dried). They eat not only the muscle tissue of meat and fish but the skin, blood, and bones as well. Their diet also contains fish oil, eggs, and very small amounts of ground nuts, berries, stems of certain water grasses, water plants, and bulbs. The inner layer of the skin of one of the whale species, which is much used by them, has been shown to be very rich in vitamin C.

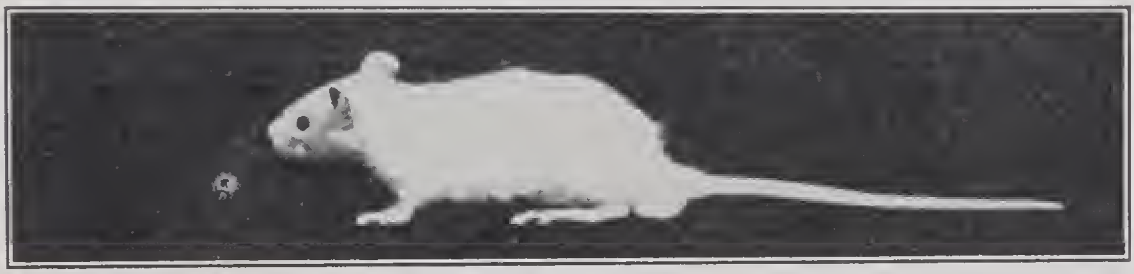
The women on this native diet produce strong, healthy children. Tooth decay is practically unknown. One woman, the mother of at least twenty children, had no dental cavities. (See Fig. 4, Chapter III.) The woman's husband, children, and son-in-law had given up the native diet for white man's food and they did have dental cavities. The mothers nurse their children for one year without difficulty, and the children have no trouble cutting their teeth. [7] This all sounds like good nutrition even though the diet is high in protein.

The last decade has brought about a change in the dietary treatment of kidney diseases. Formerly the protein of the diet usually was reduced. In many cases now the protein intake is increased with satisfactory results.

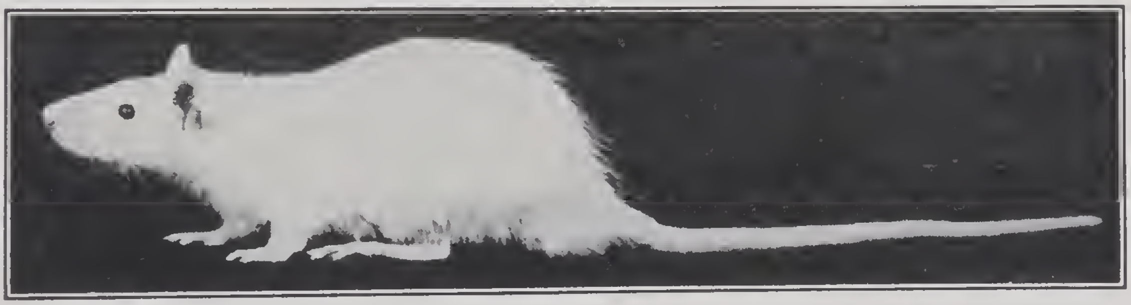
RATS FROM THE SAME LITTER, 11 WEEKS OLD



This rat had good protein but not enough. It weighs 70 grams.



This one had enough protein but of a poor kind. It weighed only 65 grams.



This one had good protein and plenty of it. It grew normally and weighed 193 grams.

Courtesy of Bureau of Home Economics, U. S. Dept. Agr.

FIG. 4. The effect of the quality and quantity of protein on the growth of rats.

A study made by New York University shows that college students of today average four inches taller than their parents. A study of the diets showed that the present-day student drinks more milk as a child and consumes 42 per cent more meat than the child in his parent's generation. [8]

A deficiency of protein in the diet affects both adults and growing children. It not only stunts growth but also apparently affects reproduction. According to some experiments with animals it is necessary that the protein be of good quality. However, if the quantity is high but the quality poor, normal reproduction will not take place. [9] Lack of protein does not twist and deform the body but it does lessen the growth (Fig. 4).

The daily allowance of protein, as adopted by the Committee on Foods and Nutrition of the National Research Council, January, 1943, is as follows:

	Grams of Protein
Adult	60–70
Pregnancy	85
Lactation	100
Infant (6 to 18 months)	1.5 per pound of body weight
Pre-school	40
School (5 to 12 years)	50– 70
Adolescent	80–100

Minerals

Protein, sugar, starches, and fat furnish the bulk of our diet, but they supply only part of the essentials. There are other substances in our food which are equally important. Those who have burned food outside the body realize that an ash is left after the food is burned. This ash is the inorganic or mineral part of our food and fulfills specific body-building and body-regulating needs. The nutritionists, working with animals, found they did not thrive on diets of pure fats, carbohydrates, and protein. We now know that minerals and vitamins were missing.

Minerals are needed by the body in relatively small amounts, but they play just as vital a part in helping to build parts of the body and in maintaining health and well-being as do the proteins. This point is illustrated by the action of calcium on the heart and of iodine on the thyroid gland. The action of the heart is essential to life, and a small amount of calcium is necessary to keep up the steady beating of the heart. The thyroid gland is small but the thyroxine which it secretes has a powerful influence over the workings of our internal processes. This gland requires iodine in order to produce thyroxine and function properly.

The mineral demands of the body are relatively small and the amount found in any one food is small. Therefore one should consider the factors which decrease the amount found in foods. For example, if carrot or any other raw food is eaten when fresh, we get everything nature provided in it. When we scrape the carrot to remove the outer coat, we remove some of the minerals and vitamins. Likewise, if we cook the carrot and discard the cooking water, we lose minerals and vitamins. In the refining processes, when the outer coats of bran are removed from grain, much mineral content is lost. In refined sugar we lose calcium and iron, both of which are needed by the body.

The soil in which the plant is grown influences the mineral content. If the soil is low in any mineral, some plants grown on that soil will be deficient in it. If, for example, the area is deficient in iodine, many plants grown on that soil will be deficient in iodine also. The same is true of other minerals.

Traces of many minerals are found in the human body even at birth. Some of the minerals have no known function, whereas others are known to play important roles. The exact number and amount of chemical elements needed by the body are not known. Those known to be essential are oxygen, carbon, hydrogen, nitrogen, calcium, phosphorus, potassium, sulfur, chlorine, sodium, magnesium, iron, manganese, copper, iodine, and probably cobalt and zinc.

Minute quantities of minerals, which are poisonous if taken in large amounts, are found in the body and are known to perform vital functions. If iodine were consumed in very large quantities the result would be death; still a minute quantity of iodine is essential. Absence, even of these small amounts of needed minerals, causes serious difficulties, as goiter, anemia, and defective bones and teeth.

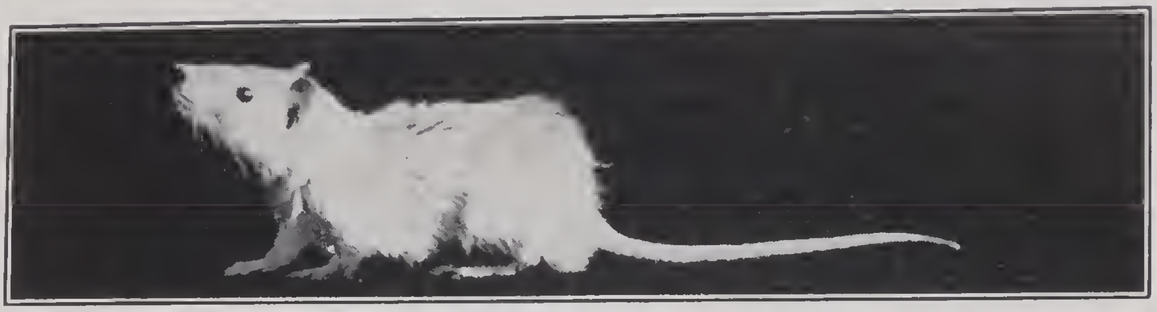
Some of the minerals needed by the body are easily supplied by a good mixed diet; others need our consideration or they may be lacking. The minerals in the latter group include calcium, phosphorus, iron, and iodine. Copper usually is no problem if iron is sufficiently high because copper and iron tend to be found in the same foods. Likewise, phosphorus is no problem if calcium and protein are supplied.

Calcium

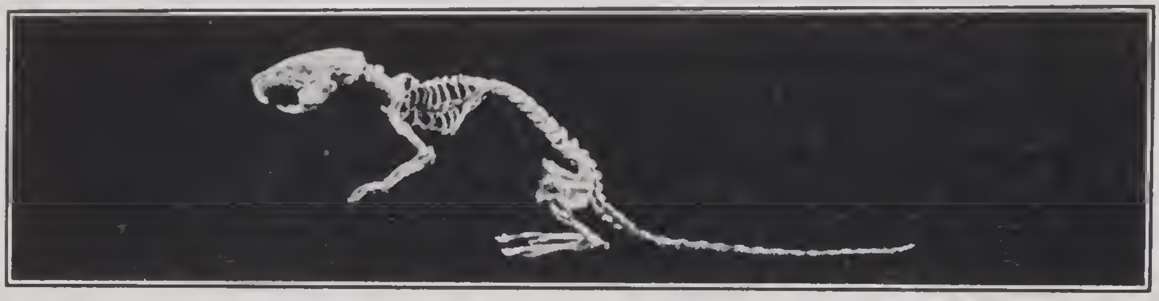
Why do we see knocked knees, bowed legs, and flat feet? They give evidence of dietary deficiencies. Rounded shoulders, mal-formed jaws, and poor teeth are also common American defects due to the same deficiencies.

Most of the calcium of the body is used for the bones and teeth. Without calcium it is impossible to have a strong, firm framework or hard teeth. These and other needs, which are met by very small amounts of calcium, greatly affect our health. For instance, calcium is needed for proper blood, muscle, and nerve functioning. Calcium is necessary to help in the clotting of the blood, to keep a slight alkaline balance, and to maintain a steady working of the heart. In the laboratory, heart muscle may be kept beating after its removal from the body if supplied with the proper proportions of minerals, including calcium, sodium, and potassium. Without sodium salts, contractability and irritability disappear. Sodium

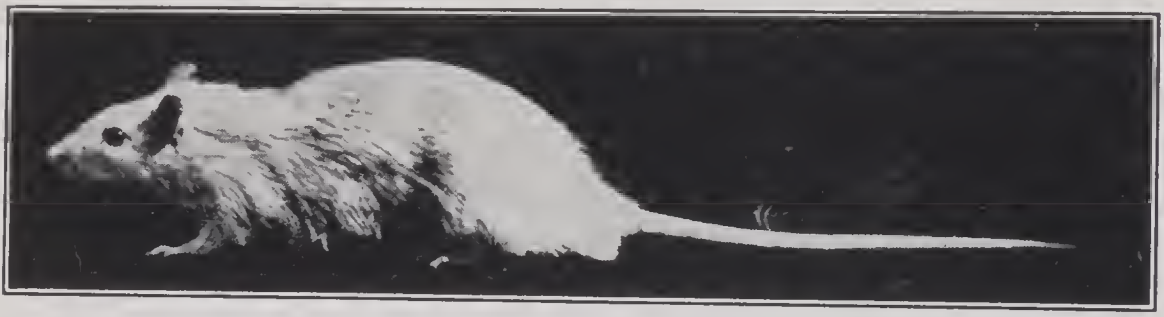
TWIN BROTHERS, 6 MONTHS OLD



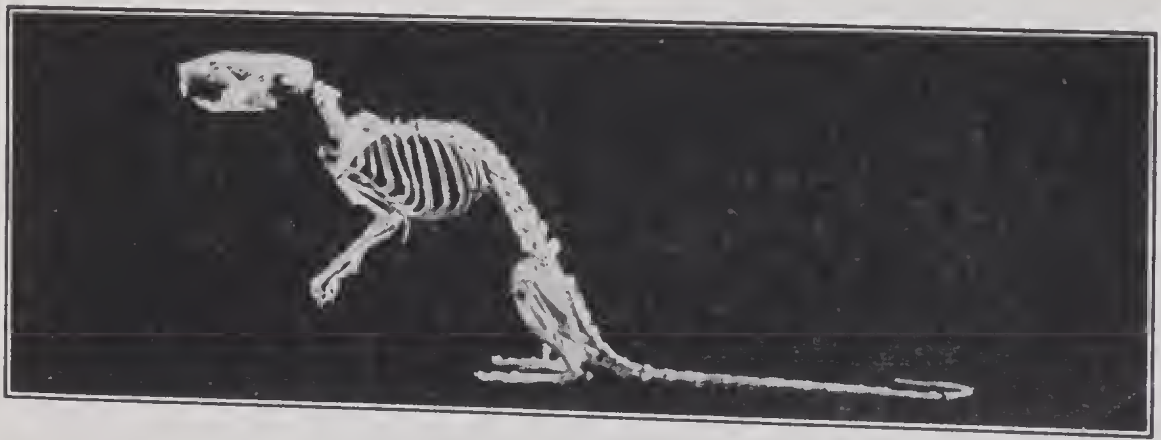
This rat ate only meat, potato, bread, and butter. He weighs 89 grams.



His bones show the effect of poor diet.



This rat ate plenty of milk and vegetables, besides meat, potato, bread, and butter. He weighed 194 grams.



His bones are strong and well formed.

Courtesy of Bureau of Home Economics, U. S. Dept. Agr.

FIG. 5. The effect of diets high and low in calcium on the skeletons of twin brother rats.

salts alone, however, cause the muscle tissue to relax. Calcium salts are also necessary to normal heart action. On the other hand, if calcium salts are present in concentrations above normal, they cause tonic contraction ("calcium rigor"). Therefore these experiments show the need for a balance between calcium, sodium, and potassium salts.

Also, calcium intake may influence the assimilation of iron. Some believe that either a deficient or a greatly excessive amount of calcium may affect the assimilation of iron unfavorably. [10]

Calcium is needed by an adult for constant repair, just as is protein. Frequently adults say, "A carnivorous animal does not need milk; so why do I?" or "A cow produces milk but does not drink milk; so why should I?"

The answer to the carnivorous-animal question is demonstrated by the story of two horned owls. These birds were brought into captivity just after birth by an adolescent boy. "Two-Bits" and "Jake," as they were called, were fed for some time by their young owner on muscle meat only. One day the boy's aunt inquired, "John, if you feed these birds only muscle meat where do they get their calcium?" "I don't know, Aunt Jane; where do they?" "In the woods," the aunt replied, "they eat the entrails, blood, bone, and all of their prey." "Oh, I'll take care of that," the boy replied. From that day on he amused the whole family by feeding each bird one or more sparrows daily. The owls ate hair, hide, and all, removing only the tail feathers. As a result the birds grew to be two beautiful big brown owls, too large for a home. (They were then sent to the New York Zoo.)

A carnivorous animal gets its calcium by eating blood, bone, and all the internal organs of its prey. A cow has four stomachs while humans have but one, and hence a cow can hold much bulk and so get its calcium from grass, hay, and grain. Since we do not eat bones and entrails, we should see that our daily diet contains a pint of milk or 2½ ounces of cheese.

Calcium Requirement. The body's requirement for calcium has been estimated by averaging the results of many balance studies. In balance studies the smallest amount of calcium that will give an equilibrium between the amount consumed and the amount excreted is found. The results of 97 such experiments, made about 1920, show calcium output to range from 0.27 to 0.82 gram, averaging 0.45 gram of calcium "per man per day." More recent experiments raise the average minimal need of adults to about 0.5 gram. [10] Many nutritionists feel that this should be increased 50 per cent to allow for individual variations and to insure an adequate supply. This makes a daily allowance of 0.75 gram. Some authorities figure that two-thirds of this should be met by milk. One pint of milk contains 0.57 gram of calcium. The additional calcium received from a mixed diet should therefore supply a sufficient amount. Research, coming largely from Sherman's laboratory, seems to show that, with increased calcium in the diet, the health of the animal improved and the life span lengthened. The daily allowance decided by the National Research Council is 0.8 gram for an adult. The bones and teeth which require calcium are forming before the infant is born and throughout infancy and childhood. Hence pregnant or lactating women and growing children should receive more than this allowance. The calcium received from an ordinary mixed diet, including a pint of milk for adults, 3 to 4 cups for children, and a quart for pregnant or lactating women, should be sufficient to meet the daily allowance.

As with other elements, we cannot be certain our body is utilizing all the calcium it receives. Phosphorus and vitamin D must be present for the proper utilization of calcium.

Some years ago a woman of about 50 years of age wrote for help with her diet. She had fallen on the ice and broken her hip. The hip had been put in a plaster cast, but when the cast was removed at the end of 8 weeks the bone had not knit. Four weeks later an x-ray showed the joint still separated. She was put in a new cast, but the doctors "doubted if the bone would knit." The cast was tight and the woman had digestive difficulty because her food caused flatulence and bloating. She tried to remedy her own diet by reducing the starches, sugar, cream, butter, tea, and coffee; she took a pint of milk, fresh and cooked fruits and vegetables, a little lean meat, a haliver oil capsule daily, and egg yolk twice a week. Because of the pain resulting from eating she wrote for advice.

Considering her as an individual, which should always be done if advising one about diet, we found a woman who had lost much weight, who had a tight cast around her hips, and whose bone must knit if she was ever to walk again. Food was important. She must get sufficient quality and quantity to make the bone knit and yet not cause gas and discomfort in the constricted alimentary tract. She needs plenty of calcium, also phosphorus, and vitamin D. It was suggested that she eat every 3 or 4 hours and that her diet include one quart of milk, one haliver oil capsule, fruit juice, tomato juice, strained or puréed vegetables, and cereals.

When the cast was removed the bone had knit. One and one-half years later she wrote that the hip was completely healed, that she walked with no support and was doing all of her own work. In fact the woman's own remark was, "I have felt like Rip Van Winkle after two years in bed."

Since this cure, two similar adult cases of bone healing have reacted in the same way to a regimen in feeding which takes into consideration the condition of the individual and his ability to take food.

All three of these adults reported difficulty taking milk as such. Milk or cheese was necessary to produce the knitting of the bone. Two adults took a small amount of milk at a time with fruit juice, and the third, who reported diarrhea from milk, received her calcium from cheese.

Sources of Calcium. Milk and cheese are our best sources of calcium. Whole milk, buttermilk, sour, skim, dried, and evaporated milk, and cheese are all good sources. Cottage cheese, malted milk, and cream are fairly good sources. Butter contains practically no calcium.

The following foods give approximately 1 gram of calcium:

1 quart whole milk (fluid).
1 quart skim milk (fluid).
1 pint evaporated milk (undiluted).
¼ pound dried milk.
⅓ pound of hard, pressed cheese such as Cheddar, Swiss, or processed.

The heating of milk has been thought by some to affect the calcium content, but apparently the effect is not important. A study of 3700 children, aged 10 months to 6 years, showed a very slight difference in growth —either in height or in weight—between those children receiving only pasteurized, boiled, evaporated, or dried milk and those receiving raw milk. [11] On the other hand, it is not advisable to drink raw milk because of the danger of undulant fever and septic sore throat. If people have their own cows, they should boil or pasteurize the milk at home.

Vegetables such as turnip greens, mustard greens, kale, broccoli, cauliflower, and rutabagas contribute calcium to the diet. Molasses and nuts are good sources, too.

Recently a considerable amount has been written about the ill effects of spinach on calcium retention. Fincke and Sherman found from experiments with rats that the calcium of spinach was not as well utilized as the calcium of kale—the difference was thought to be due to the presence of oxalic acid. Many assumed that spinach should therefore be tabooed. But Macy and co-workers have shown that with children on a good diet a serving of spinach added to the daily diet had no significant effect on calcium retention. Spinach is a good source of iron, vitamins A and C, and riboflavin and should have its place in the diet.

Fruits, meats, and grain products furnish very little calcium.

Although calcium deficiency is common in the United States, if one consumes 2 to 3 cups of milk daily, it is easy to meet the calcium requirement. Cheese makes a good substitute for a portion of the milk if one wishes variety. The homemaker who tries to supply the family calcium requirement without the use of milk or cheese will find it is a very difficult problem. Vegetables, particularly the green, leafy ones, are good sources of calcium. Because of their bulkiness, it is practically impossible, however, to rely on green vegetables for the entire source of calcium. Soybeans are a good source and are used in countries like China, where milk is scarce. In some parts of China, because of the lack of milk, bones of animals are cooked in edible acid (rice vinegar) to remove the calcium, and this is fed particularly to pregnant and lactating women. [12] Interestingly enough, in some parts of China, egg shells, which are high in calcium content, are dissolved in rice vinegar and used as a tonic but not as a food.

Following is a diet, showing the calcium content with 1 pint of milk or with cheese in place of the milk. If your diet contains no milk, eat about 2½ ounces of American Cheddar or other hard pressed cheese daily.

Table 4. A Day's Diet Supplying Adequate Calcium, with and without Milk To Drink

WITH MILK	GRAMS OF CALCIUM	WITHOUT MILK	GRAMS OF CALCIUM
Breakfast		*Breakfast*	
½ cup grapefruit	0.021	½ cup grapefruit	0.021
2 slices whole-wheat toast	0.041	2 slices whole-wheat toast	0.041
1 egg	0.031	1 egg	0.031
1 cup coffee, 2 tbsp cream	0.011	1 cup coffee, 2 tbsp cream	0.011
Lunch		*Lunch*	
1 bowl navy-bean soup with ham bone	0.054	1 bowl navy-bean soup with ham bone	0.054
2 slices whole-wheat bread and lettuce sandwich	0.041	2 slices whole-wheat bread and lettuce sandwich	0.041
1 cup milk	0.288	1 peach custard	0.201
Peaches	0.011	Tea	
Dinner		*Dinner*	
Tomato juice and wafer	0.007	Tomato juice and wafer	0.007
Lamb chop	0.008	Lamb chop	0.008
Baked potato	0.014	Baked potato	0.014
Buttered peas	0.023	Buttered peas	0.023
Apple pie	0.007	Apple pie	0.007
1 cup milk	0.288	Cheese, Swiss, 1″ cube, or 1 slice 4½″ × 3½″ × ⅕″	0.363
Total	0.845	Total	0.822

The daily allowance of calcium, as adopted by the Committee on Foods and Nutrition of the National Research Council, January, 1943, is as follows:

	Grams of Calcium
Adult	0.8
Pregnancy	1.5
Lactation	2.0
Infant (6 to 18 months)	1.0
Pre-school	1.0
School (5 to 12 years)	1.0
Adolescent	1.0–1.4

Table 5. Some of the Best Sources of Calcium

FOOD	MEASURE	GRAMS OF CALCIUM
Cheese, Swiss	1 slice 4½″ × 3½″ × ¼″	0.545
Turnip greens	½ cup	0.347
Milk, skim	1 cup	0.294
Milk, whole	1 cup	0.288
Cheese, American	1 cube, 1½ in. sq.	0.214
Milk, dried, whole	3 tbsp	0.181
Mustard greens, steamed	½ cup	0.147
Broccoli	2 to 4, 6″ stalks	0.140
Molasses	2 tbsp	0.120
Kale, cooked	½ cup	0.090
Almonds	¼ cup	0.084
Figs	3 medium	0.077
Beans, navy, cooked	½ cup	0.053

Phosphorus

Small, misshaped bones may be the result of a phosphorus deficiency since phosphorus and calcium are needed in the proper proportions for bone building. The bulk of the body's phosphorus, like that of calcium, is found in the bones and teeth; it is also present as phospholipins and phosphoproteins in brain, muscles, and blood.

Phosphorus Requirement. The phosphorus requirement, like the calcium requirement, is determined by balance studies. Sherman reports the results of 95 such experiments upon 21 subjects—14 men and 7 women. The results showed a range of 0.52 gram to 1.20 grams with an average of 0.88 gram of phosphorus per 70 kilograms, 154 pounds body weight, per day. With this, as with the calcium, 50 per cent is added to make the so-called dietary standard for adults. [10] For children, on the other hand, 1 gram is the generally accepted allowance.

Sources of Phosphorus. Phosphorus is more widely distributed in nature than is calcium. Meat, fish, dried beans, milk, cheese, and egg are all good sources of phosphorus. If one's calorie, protein, and calcium requirements are met, there is little chance of a phosphorus deficiency.

Table 6. Some of the Best Sources of Phosphorus

FOOD	MEASURE	GRAMS OF PHOSPHORUS
Turkey, dark meat	4 slices 2″ × 1¼″ × ⅛″	0.422
Liver, beef	¼ lb scant	0.370
Salmon, canned	½ cup	0.285
Veal roast	1 piece 3.5 oz	0.280
Tuna fish	½ cup	0.261
Milk, skim, fresh	1 cup	0.231
Milk, whole	1 cup	0.229
Beans, lima, dried	⅓ cup	0.220
Beef, lean muscle	1 slice 2½″ × 2½″ × ⅓″	0.211
Cheese, Swiss	1 thin slice	0.160
Cheese, American	1 cube, 1⅛ in.	0.159
Brazil nuts	5	0.120

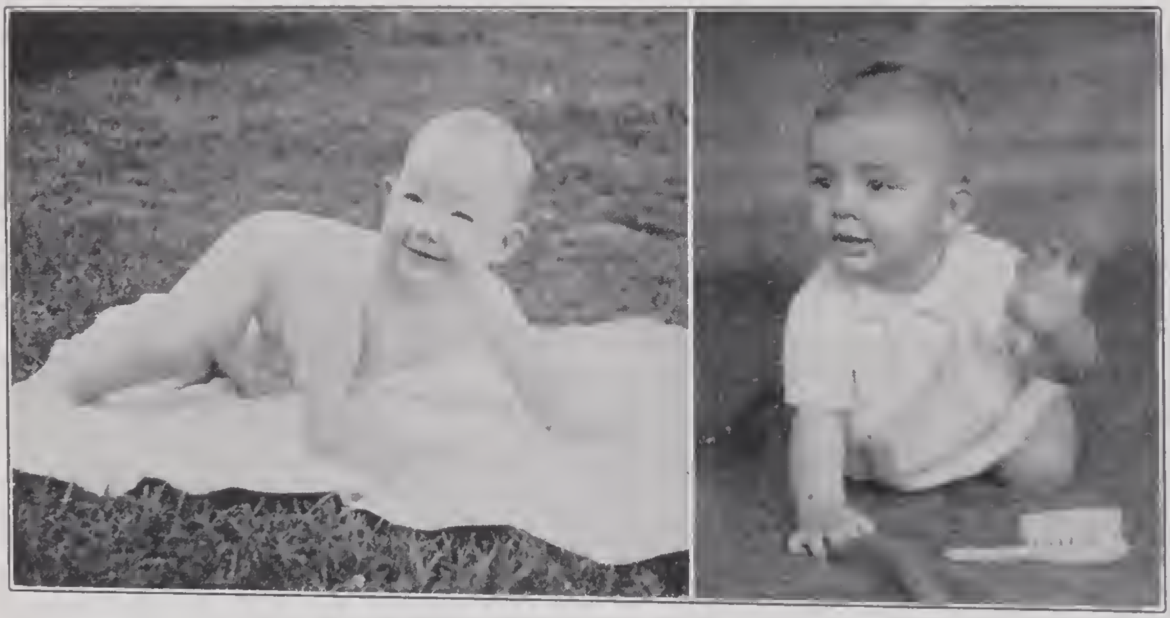


FIG. 6. On the left, Alice, whose diet had been low in iron. On the right, Donnie, whose diet supplied sufficient iron. If these pictures were reproduced in color the reader would be surprised at the superior coloring of Donnie.

Iron

Watch the human procession—does it present a healthy, colorful, energetic population or do you see listless, tired, and pale people? Lack of pep and color are general symptoms of anemia. One cause of anemia is lack of sufficient iron in the diet. This mineral frequently is lacking in the American diet even though our bodies need a very small amount. A teaspoon of iron would supply the daily requirement of over three hundred people. Anemia is fairly common in women and growing children, but men are rarely anemic.

Undoubtedly anemia was more prevalent in ancient times than today. In the Middle Ages vegetables were used as medicine rather than as food. One writer who lived during the first half of the sixteenth century says that lupines were used to improve one's color—a remedy that many of the fine ladies greatly needed. [13] We would now ask how they could look anything but pale on a diet composed chiefly of cereal or bread and salt meat.

Iron is needed in the body for the formation of hemoglobin—the coloring substance of the blood; copper also is necessary for the iron to be utilized. Hemoglobin is the substance in blood which carries oxygen from the lungs to the various parts of the body. Anemia, due to low hemoglobin, is evidenced by paleness and lack of pep. Lack of iron in the daily diet is not the only cause of anemia but it is a very common one. Anemia may also be caused by loss of blood or by some faulty condition which results in deficient blood-cell formation.

Iron Requirement. Few balance studies have been made on the iron requirement. Results of 21 experiments show an average of 8.11 milligrams for an adult. If the usual 50 per cent is added as a margin of safety, the daily allowance will be 12 milligrams of iron per adult per day. [10] Since nature provides the baby before birth with a store of iron and since the mother must supply the baby with iron in breast milk, the dietary standard is higher in pregnancy and lactation. Studies have shown that many women are anemic during the latter part of pregnancy.

Although few studies have been made on the iron requirement of the adult, fewer have been made on the iron requirement of the child. Until more knowledge is available, it would therefore seem wise to adopt a generous standard.

The ability of the body to assimilate food substances varies with different individuals. It is possible to take a sufficient amount of iron into the body, but unless it is properly assimilated the body derives no value from it. The failure to utilize iron effectively may be due to some faulty functioning of the body, to the form in which the iron is used as food, or to lack in the diet of some other substance which is necessary for the proper assimilation of iron. To illustrate this point: carbohydrates, that is, the starches and sugars, cannot be used if the pancreas is not secreting insulin; calcium is not utilized for bone formation unless phosphorus and vitamin D are present; iron needs the presence of copper to form hemoglobin.

Research has been conducted on the availability of the iron of different foods. Some conclude that it is well to take about twice as much iron in the diet as is actually required. This is because part of the iron which a chemical analysis shows to be present in food may be so combined with other substances that it cannot be used by the body. [14] The absorption of iron is apparently favored by a normal acid reaction in the stomach. An iron-rich diet may be ineffective for the regeneration of hemoglobin if soda is taken medicinally.

Table 7. Diets Supplying Adequate and Inadequate Iron

ADEQUATE IN IRON	GRAMS OF IRON	INADEQUATE IN IRON	GRAMS OF IRON
Breakfast		*Breakfast*	
1 medium orange	0.00080	½ cup orange juice	0.00025
2 slices whole-wheat toast	0.00096	2 slices white toast	0.00046
2 tbsp butter	0.00006	2 tbsp butter	0.00006
1 egg (soft-cooked)	0.00155	½ cup light farina	0.00030
1 cup coffee, sugar, cream	....	¼ cup cream, 18%	0.00010
		1 cup coffee, sugar	....
Lunch		*Lunch*	
½ cup baked beans	0.00355	¾ cup cream of tomato soup	0.00083
2 slices Boston brown bread	0.00180	2 slices white bread	0.00046
3–4 leaves lettuce (French dressing)	0.00025		
1 baked apple	0.00068	1 piece pumpkin pie (4½″ sector)	0.00100
1 cup milk	0.00049		
Dinner		*Dinner*	
2 swiss steak (2″ × 3″ × 1″)	0.00300	1 slice leg of lamb (3½″ × 4½″ × ⅛″)	0.00164
cooked in tomato	0.00040	½ cup buttered rice	0.00025
1 baked potato (medium)	0.00108	2 slices egg plant (4″ in diameter)	0.00050
5 stalks of asparagus	0.00100	Salad	
		½ cup grapefruit	0.00030
		2 leaves lettuce (French dressing)	0.00013
½ cup ice cream	0.00020	Lemon ice	....
2 cookies	0.00010	Angel food cake	....
Total	0.01592	Total	0.00628

Sources of Iron. Liver is an excellent source of iron. At one time liver, as a food, was thought to be more harmful than beneficial. It was regarded as high in purin or in purin-producing substances, and purines in the diet supposedly caused gout. Research has proved liver to be a very nutritious food. It contains all known vitamins and is an excellent source of iron, copper, and complete protein. Liver formerly was practically given away by meat markets, and, interestingly enough, it apparently had no harmful effects on the poor who consumed it. Now one wonders how the poor get their iron and vitamins since research has made liver much sought after and thereby a rich man's food. By 1939, the average retail price of beef liver was 26.8 cents per pound.

Table 8. Some of the Best Sources of Iron

FOOD	MEASURE	GRAMS OF IRON
Liver, beef	¼ lb scant	0.0082
Liver, pork	¼ lb scant	0.0082
Tongue	4 thin slices	0.0069
Turkey, dark meat	4 slices 2″ × 1¼″ × ⅛″	0.0059
Beans, lima, dry	⅓ cup	0.0049
Chard, Swiss	½ cup	0.0047
Oysters	5 to 6 medium	0.0046
Kidney, veal	½ kidney, 4¾″ long	0.0041
Mustard greens, steamed	½ cup	0.0037
Turnip greens, steamed	½ cup	0.0035
Molasses	2 tbsp	0.0034
Beet greens	½ cup	0.0032
Beef, round	3.5 oz	0.0030
Apricots, dried	9 halves	0.0027
Spinach, cooked	½ cup	0.0026
Egg yolk	1 medium	0.0016

Oysters, lean meat, and kidneys are also very good sources of iron. The green, leafy vegetables, such as chard, mustard greens, turnip greens, beet greens, and spinach, as well as egg yolk, are good sources of iron. Peas, beans, fresh or dried, whole-grain cereals, and dried fruits, especially apricots, all contribute a goodly supply. Among the sweets, molasses rates high. Milk and milk products are poor sources of iron.

The menus in Table 7 show that it is easy to get an adequate amount of iron in the day's diet if one plans each meal to contain at least one iron-rich food. On the other hand, without this consideration one may have what sounds like a good diet but, when checked, contains only one-third of the day's iron allowance.

The daily allowance of iron, as adopted by the Committee on Foods and Nutrition of the National Research Council, January, 1943, is as follows:

	Milligrams of Iron	*Grams of Iron*
Adult	12	0.012
Pregnancy	15	0.015
Lactation	15	0.015
Infant (6 to 18 months)	6	0.006
Pre-school	7	0.007
School (5 to 12 years)	8–12	0.008–0.012
Adolescent	15	0.015

Copper

Little was heard about the body's need for copper until scientists, working on cures for anemia, discovered that traces of something other than iron seemed to be necessary for hemoglobin formation. Copper is not a constituent of hemoglobin, but it is necessary for its formation. It is also present in the muscles, bones, liver, and blood of the body.

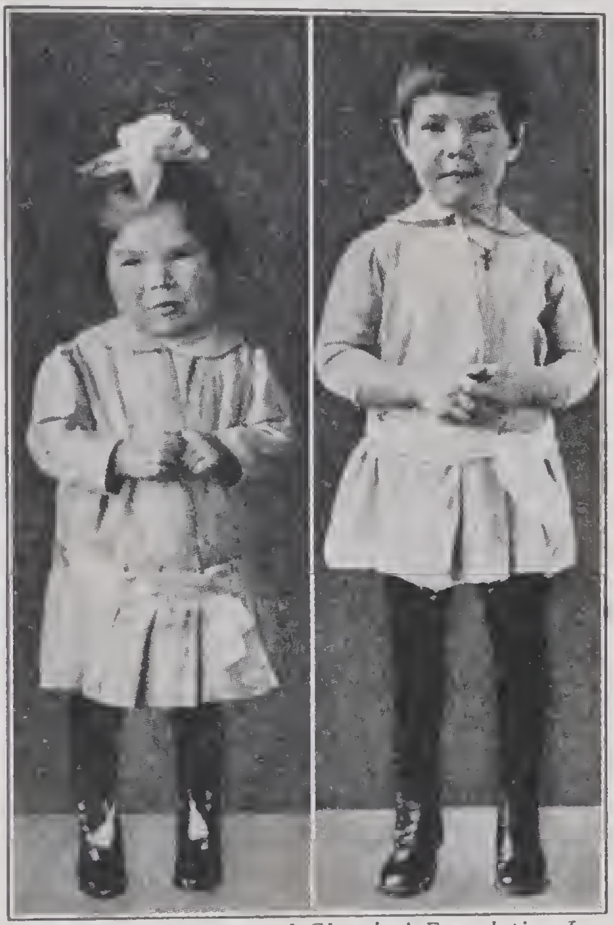
Copper Requirements. Judging from experimental work to date, the adult man's requirement for copper is approximately 2.4 milligrams. Adding the 50 per cent safety factor, the allowance would be 3.6 milligrams. [10] The woman's requirement is slightly higher than this. Women need more during pregnancy and lactation. There are no studies to show the requirement for children. Copper deficiency is rare. Iron-rich foods usually are also good sources of copper. If the iron requirement is met, there is little chance of copper deficiency. According to the National Research Council the requirement for copper is approximately one-tenth that for iron.

Sources of Copper. As was said above, good sources of iron are usually good sources of copper. Liver, oysters, and molasses are high in copper. Leafy vegetables, legumes, and apricots are also good sources. Copper, however, has been found to occur in practically all natural, unrefined foods, such as nuts, dried legumes, cereals, dried fruits, poultry, and fish.

Iodine

Goiter is one of the oldest known deficiency diseases. As early as the thirteenth century the ash of burned sponges was used to treat goiter. [15] The presence of iodine in the thyroid gland was not known until discovered by Baumann in 1895. Iodine was not associated with nutrition until about 1917. [16, 17] About this time pigs were being born in the western part of the United States hairless, with enlarged thyroid glands. Many were either dead at birth or died shortly after. This condition was prevented in the next litter by giving sodium or potassium iodide to the pregnant mother.

Lack of iodine is now known to cause simple goiter. The thyroid gland secretes a substance called thyroxine which plays an important role in regulating the energy metabolism of the body. This gland cannot function properly without iodine. Minute quantities of iodine are also present in the blood tissue.



Courtesy of Chemical Foundation Inc.

FIG. 7. Effect of thyroxine on a child suffering from cretinism due to defective thyroid secretion. From *Chemistry in Medicine*, 1928.

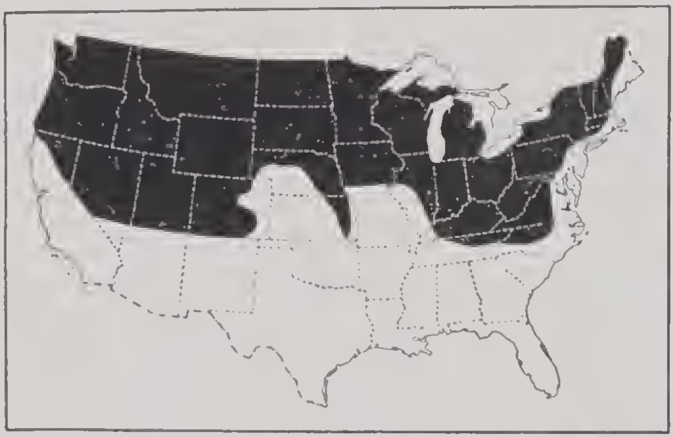
Obtaining a sufficient amount of iodine is no problem unless one lives in the goiterous regions. Goiter areas tend to be in mountainous areas or in regions too far from the sea to receive significant amounts of iodine. In the United States this region includes the Great Lakes area and much of the Northwest. Simple goiter is common in these areas (Fig. 8).

Iodine Requirement. Iodine balance studies are difficult since the amount of iodine required is small, the amount in food is small, also the amount excreted is very small. According to the National Research Council the requirement for iodine is about 0.15 to 0.30 milligram daily for the adult.

Sources of Iodine. Iodine is obtained from food and water. Seafoods and cod-liver oil are our best food sources of iodine. Comparative amounts of iodine in different materials are shown below: [18]

Food	*Amount*	*Micrograms * of Iodine*
Cod-liver oil	1 tsp	40–50
Salt-water fish	1 serving	20–60
Iodized salt	1 tsp	800

* A microgram is one-millionth part of a gram. A gram is approximately one-thirtieth of an ounce.



Courtesy of Jr. A. M. A.

FIG. 8. Goiter area in the United States. Data from McClenden, "The Draft Board," *Jr. A. M. A.*, 1924.

Plants get their iodine from the soil so that plants grown in iodine-deficient soil are deficient in this mineral. For this reason the iodine content of plant foods varies considerably. Studies have also been made showing that the iodine content of water is variable.

In an iodine-deficient region iodized salt has been approved as a good source of iodine. The use of salt containing 1 part of sodium (or potassium) iodide to from 5000 to 200,000 parts of sodium chloride is a matter of restoring salt to approximately its natural composition. It should not be considered a drug or medicine. The American Medical Association's Committee on Foods has approved the use of iodized salt. Research with school children shows that small amounts of iodine prevent goiter. [19] Simple goiter is most prevalent during adolescence and, in women, especially during pregnancy and lactation. Therefore some authorities advise additional iodine taken as iodized salt, cod-liver oil, sea fish, or oysters for these groups.

There are other forms of goiter and other thyroid difficulties not amenable to dietetic treatment, as is simple goiter. Therefore a competent physician should be consulted for any thyroid disturbance.

Table 9. Some of the Best Sources of Iodine *

FOOD	MILLIGRAMS † PER 100 GRAMS
Cod-liver oil	0.30–1.30
Oysters	0.12
Cod, salted	0.07
Sardines, canned	0.04–0.06
Shrimp	0.04
Haddock	0.03
Crab meat, flaked	0.02
Cod	0.02
Salmon, canned	0.01–0.06

* Council on Foods of the American Medical Association, *Accepted Foods and Their Nutritional Significance*, 1939, and I. N. Kugelmass, *Newer Nutrition in Pediatric Practice*, 1940, have been used to obtain the iodine values.

† A milligram is one-thousandth of a gram.

Other Minerals

Traces of many minerals have been found in the human body. The function of many of these is unknown—perhaps they are not essential. Research is being carried on with many minerals. Cobalt, for example, has been found essential for animals; as yet we are unable to say whether it plays a role in maintaining human health.

Fluorine has been reported to affect the teeth. In some regions where fluorine is present in the water the teeth become mottled. One study of 2832 white children, 12 to 14 years of age, showed a difference in dental caries, apparently depending upon the presence of a small amount of fluorine in the drinking water. There were 14 times as many dental caries in the 1008 children drinking fluorine free water as among the 1421 where the drinking water contained 1.2 to 1.8 parts of fluorine per million. The fluorine content was low enough so that mottled teeth did not result. [20] This sounds as though a small amount of fluorine is beneficial in preventing tooth decay. However, another study in a different area showed that fluorine was apparently the cause of structurally weak teeth. The water in the community studied contained 1.6 to 4.0 parts of fluorine per million. The teeth in this area became mottled and, although they seemed more resistant to the onset of decay, they decayed badly later. Thirty-three per cent of the children 12 to 14 years of age had carious teeth. And of those beyond 21 years of age there were relatively few without caries. That decay was serious and repair unsuccessful was shown by the fact that more than 50 per cent of the young adults 24 to 26 years of age had false teeth. [21] Whether small amounts of fluorine are beneficial and a greater amount injurious we are unable at this time to say. Research may reveal many useful functions for the various minerals, but findings must be verified before being accepted for practical use.

Table 10. *Uses and Sources of Minerals*

MINERAL	BODY USES	GOOD SOURCES
Calcium	Bones and teeth, soft tissue, for regulatory functions. Regulates heart beat, aids in clotting of blood	Whole milk, sour milk, buttermilk, skim milk, dried milk, evaporated milk, cheese
Phosphorus	Bones and teeth, soft tissue, for regulatory functions	Meat, fish, dried beans, milk, egg, whole-grain cereals
Iron	Formation of hemoglobin	Liver, oysters, apricots, eggs, green, leafy vegetables, lean meat, dried beans, peas, whole-grain cereals
Copper	Formation of hemoglobin. Is present in muscles, bones, liver, and blood	Liver, oysters, molasses, leafy vegetables, legumes, apricots
Iodine	Proper functioning of thyroid gland	Seafoods and cod-liver oil

Vitamins

In the last two decades we have been given considerable information about those "mysterious" substances called vitamins. The name vitamin, meaning life-giving amines, was given these substances and, though erroneous in description, is dramatic in sound. Until the last few years vitamins seemed mysterious since we could not see or touch them but could only note the effects produced when some of them were absent from food. Work has progressed rapidly in this field, and vitamins are now being isolated so that we may see them in their pure forms and thus figure the human requirement for some of them quantitatively. Just as energy is measured in calories, calcium and phosphorus in grams, iron in milligrams, so vitamins are measured in micrograms, milligrams or International Units. When the human vitamin requirement or allowance is stated, the measure of the vitamin values will be given in one of these terms.

DEFINITIONS FOR VARIOUS VITAMIN UNITS

Vitamin A

The International Unit of vitamin A is the value supplied by 0.6 microgram of pure beta-carotene. The U. S. Pharmacopeia (U.S.P.) unit of vitamin A has the same value. 1 I.U. = 1 U.S.P.

Vitamin D

The International Unit of vitamin D is the value of 1.0 milligram of a solution of ergosterol activated by irradiation and dissolved in 10 cc of olive oil.

Vitamin B_1 (Thiamin)

The International Unit of vitamin B_1 (thiamin) is the value of 3.0 micrograms of pure crystalline vitamin B_1 hydrochloride. 1 milligram = 333 I.U.

Vitamin C

The International Unit of vitamin C is the value of 0.05 milligram of ascorbic acid. 1 milligram = 20 I.U.

The number of International Units (I.U.) in 1 milligram differs for the various vitamins. Thus 1 milligram of vitamin B_1 (thiamin) is 333 I.U., whereas 1 milligram of vitamin C (ascorbic acid) is only 20 I.U.

Many persons have thought of vitamins as a passing food fad. This is because vitamins captured the imagination, were much publicized, and false claims were, and still are, being made for them. Even such products as face creams have used the vitamins as a selling point. However, their importance in the diet has been completely proved. Warring countries, realizing the importance of proper food, are putting forth special effort to find new and inexpensive sources of vitamins and to keep the vitamin content of their rationed diets high. If vitamins are necessary to keep soldiers, sailors, and aviators healthy and to keep up the morale of those at home, they are also necessary for each of us to maintain the best of health regardless of occupation. They are necessary to promote the best utilization of our food and for the best working of the tissues and organs of the body at all ages.

Many minor ailments such as fleeting pains in the joints, night blindness, ear trouble, digestive upsets, neuritis, bleeding gums, bad teeth, lesions of the lips at edges of the mouth, as well as more serious diseases such as scurvy, xerophthalmia, beriberi, rickets, and pellagra, may be attributed to the lack of one or more vitamins. This knowledge as to the specific cause of each ailment is one of the greatest contributions of modern science. All these deficiency conditions are being decidedly improved or prevented with the use of vitamins. The people of the United States have tended to sit back smugly and point to other countries for examples of these so-called deficiency diseases. Recently we have been awakening to the fact that we have many examples in our own country. As methods for measuring the vitamin needs of the body are put into use, we find an amazing number of our population that has what might be termed "mild" deficiency symptoms. The symptoms are not sufficient or severe enough to have given rise to a specific deficiency disease, but they have lowered the health and vitality of part of our population.

Many persons who believe vitamins are essential to health feel that it is necessary to go to the drug store and spend extra money buying vitamins in concentrated forms. If you are healthy and on a diet with an abundance of high-quality foods from the standpoint of nutritive value, it should not be necessary to patronize the drug store for your vitamins—food is your best source.

New vitamins are constantly being discovered. It is possible that some of our food needs are still unknown. If we are living on a diet of natural foods, we are likely to include these unknown substances. Since we need food for calories, protein, and minerals, this seems the best way to get our vitamins.

Retain the vitamin content of food as far as possible. Foods in the natural state tend to contain more vitamins and minerals than refined foods. Nature could meet these needs for us, but in this industrial age we too often work against nature in our efforts at so-called improvement by refining. Several decades ago more foods in the natural state were used, and this procedure was better from the standpoint of health. Industrialization and transportation have brought us many conveniences. They have also brought us new problems in food selection.

The refining processes are often detrimental as far as food value is concerned. The polishing of rice does not reduce its energy or calorie value but it does remove other needed substances. Polished rice may appeal to the eye, but, just as is true of white flour or white cornmeal, we are sacrificing quality (vitamin and mineral) for appearance.

The various methods of preservation affect the vitamin content of the food. In canning, if the food is exposed to air during the cooking, as in the open-kettle method, oxidation destroys some of the vitamin C. A relatively large percentage of the water-soluble vitamins of vegetables is lost in the cooking water which many homemakers unwisely discard instead of using in gravies, sauces, soups, or beverages.

The aging of food not only affects the appearance but the vitamin content also.

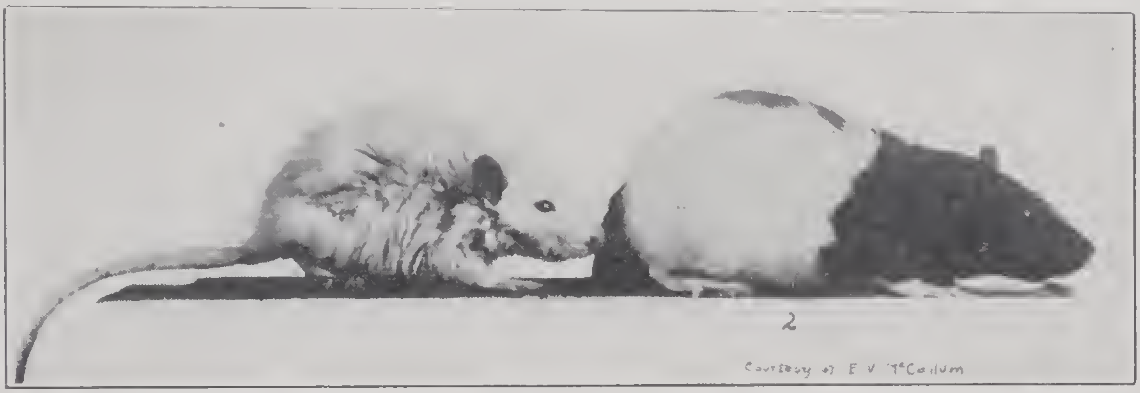
The food value is higher if the food is eaten or preserved immediately after harvesting. For this reason one is wise to pick fruits and vegetables from his own garden and use them immediately.

Recent research shows that the variety of the plant and the soil upon which it is grown have a bearing on the vitamin as well as on the mineral content.

Vitamins by their nature divide themselves into two distinct groups, fat-soluble vitamins A, D, E, and K, and water-soluble vitamins, B_1 (thiamin), riboflavin, niacin (nicotinic acid), and vitamin C (ascorbic acid).

Fat-Soluble Vitamins

The fat-soluble vitamins, as their name implies, are soluble in fat and hence are found largely in fatty substances. Thus some of our best sources of vitamin A are liver, fish-liver oil, egg yolk, and butter. Its precursor carotene (see page 50) is found in green and yellow vegetables. The best sources of vitamin D are fat fish, fish oils, liver, and egg yolk; some of our best sources of vitamin E are vegetable oils and cereal-germ oils (whole-grain cereals); some of our best sources of vitamin K are green leaves, animal organs, and egg yolk.



Courtesy of E. V. McCollum

FIG. 9. Same age, same food, except Rat 1 had vegetable oil that lacked vitamin A, and Rat 2 had butter fat rich in this vitamin.

Vitamin A. History shows that people in different areas have selected foods and food combinations that had a value for keeping them well. The Egyptians and Chinese knew as early as 1500 B.C. that livers of animals improved vision in dim light. Liver treatment was apparently recommended for eyesight by Hippocrates. Today we know that it is the vitamin A content of the liver that produces this result.

Scientists tried to feed animals on purified foodstuffs. The experiment showed that the animals did not grow normally; they died early and also developed eye disease. When butter fat was added to the diet, the animal's life was prolonged and the eye disease no longer developed. This curing factor contained in butter was later to be known as vitamin A.

Vitamin A is needed in the body for successful reproduction; for growth; for the proper functioning of the epithelial cells (the cells contained in the surfaces of the body as the skin and also the membranes of the internal surfaces as the nose, throat, and lungs); for proper formation of the teeth; for prevention or cure of night blindness or the more serious eye disease xerophthalmia.

When vitamin A is lacking in the diet, one of the first indications is a condition called night blindness. Vitamin A is needed by the eyes to enable them to adjust to dim light following exposure to a bright light. If sufficient vitamin A is not supplied to the rods of the retina of the eye, night blindness results. The degree of night blindness depends upon the seriousness of the vitamin A deficiency. Complete blindness in dim light may result. Night blindness may be a serious handicap to one who drives an automobile or to an aviator. In aviation, where the eyes are continuously used over long periods at a time, vitamin A reserves are constantly being depleted, therefore, the diet should be scrutinized to be sure that vitamin A-rich foods are included (see Table 11). It may be necessary in such cases to add vitamin A concentrates, such as cod-liver oil or halibut-liver oil (see page 184). Many accidents at night may be caused by this disorder. Omitting cream and butter from the diet in weight reduction might prove quite serious because of the depletion of vitamin A. For example, a high-school teacher on a reducing diet of this kind not only was affected with night blindness but also could not see the figures on the blackboard from the back of the room. When her oculist told her to put cream and butter back in her diet the eye condition improved.

Xerophthalmia, a serious type of eye disease caused by a marked vitamin A deficiency, is fortunately rare in this country. Figure 8, Chapter I, shows a Danish baby suffering from this disease.

Experiments seem to show that the functioning of the epithelial cells is also affected by the lack of vitamin A. If these cells are not functioning properly, the body's defense against infection is lowered.

It has been claimed that vitamin A prevents colds and is an anti-infective vitamin. Today authorities agree that vitamin A is not a specific infection preventative. It is generally accepted that a deficiency of vitamin A, because of its weakening effect on protecting membranes, lowers one's resistance to infection. However, if the body has a good store of vitamin A and the individual is on a good diet, additional vitamin A will not build up additional resistance.

Animal experiments show that abnormalities of reproduction are likely to result from vitamin A deficiency. Degeneration of the placenta may occur after the middle of pregnancy, resulting in hemorrhage and abortion. [22]

One of the causes of defective tooth formation may be lack of vitamin A during the period of tooth development.

When more vitamin A is taken into the body than is needed, part at least of the excess is stored, mainly in the liver.

Vitamin A is fairly stable, that is, it is less likely to be lost in food preparation or in the manufacturing processes than some of the other vitamins. Vitamin A is not appreciably affected by the temperature of boiling water, by the canning process, or by freezing. Foods stored in their natural state also retain their vitamin A potency for many months. However, vitamin A may be destroyed by oxidation. Dried products show a considerable loss of vitamin A.

Requirement of Vitamin A. The adult requirement for vitamin A for a man weighing 154 pounds is approximately 1750 to 3850 I.U. daily. [10] Taking the average of experimental data and adding a 50 per cent margin for safety, the allowance would be 4163 I.U. The National Research Council adopted 5000 I.U. for the daily adult allowance. This is not difficult to obtain in each day's requirement and, since vitamin A is stored in the body, meeting the requirement each day is not absolutely necessary. It is possible to obtain a minimum of 9000 I.U., or approximately two days' supply, from one serving of beef liver. A serving of dandelion greens will do the same. One small tomato and one serving of apricots will give approximately one-half a day's allowance. By studying the chart (page 51) one can easily plan to obtain sufficient vitamin A daily.

A daily allowance of 2000 to 5000 I.U. of vitamin A for growing children should be enough to allow for growth and to provide a sufficient amount for storage. The daily allowance in pregnancy is 6000 I.U. and in lactation 8000 I.U., according to the National Research Council. It should be remembered that excess vitamin A is stored in the liver, so that if one's background of vitamin A nutrition has been good this larger amount may not be necessary.

Sources of Vitamin A. Vitamin A, as such, is found in animal food products such as liver, egg yolk, fat fish, cheese, milk, butter, and cream. The best source is liver. Since white fish store their fat in the liver, vitamin A is found in the liver of such fish as cod, tuna, bass, and halibut but throughout the body of fat fish such as salmon, sardines, and mackerel.

Vitamin A is fat soluble; therefore it is the fat of these products that contains the vitamin A.

Vegetables and fruits do not contribute vitamin A directly to the body but they contain substances called carotenes and cryptoxanthine, known as precursors of vitamin A, from which the body can manufacture vitamin A. Fruits and vegetables of a deep-yellow or green color usually contain a good supply of these substances. Examples are spinach, chard, kale, turnip greens, broccoli, dandelion greens, sweet potatoes, winter squash, carrots, apricots, yellow peaches, and tomatoes. Cereals and cereal products (flour) contain very little vitamin A. A serving of yellow cornmeal, the best cereal source of vitamin A, gives only 70 vitamin A units of the 5000 daily allowance.

The daily allowance of vitamin A, as adopted by the Committee on Foods and Nutrition of the National Research Council, January, 1943, is as follows:

	International Units
Adult	5,000
Pregnancy	6,000
Lactation	8,000
Infant (approximately 6 to 18 months)	1,500
Pre-school	2,000
School (5 to 12 years)	2,500–4,500
Adolescent	5,000–6,000

Table 11. Some of the Best Sources of Vitamin A and Its Precursors *

FOOD	MEASURE	I.U.
Spinach, cooked	½ cup	25,000
Endive, fresh	2 stalks 5¾″ long	15,000
Chard, Swiss, cooked	½ cup	13,500
Kale, cooked	½ cup	10,000
Turnip greens, cooked	½ cup	10,000
Liver, beef	1 slice 5″ × 2½″ × ¼″	9,000
Broccoli	2 to 4 stalks, 6″ long	9,000
Dandelion greens, steamed	½ cup	8,000
Potato, sweet	1 medium	5,250
Liver, pork	1 slice 5″ × 2½″ × ½″	5,110
Cod-liver oil †	1 tsp	3,400
Squash, winter, cooked	½ cup	4,000
Peppers	1, 3″–4″ long	3,500
Apricots, dried	¼ cup	2,500
Prunes, dried	12 medium	2,500
Pumpkin	½ cup	2,500
Carrots, fresh, cubed	¾ cup or 1 large	2,100
Cheese, cream	7 tbsp	2,100
Tomato, ripe	1, 2″ diameter	1,100
Peaches, yellow	1 medium	1,000
Squash, summer	½ cup	1,000

* The exact value of precursors as a source of vitamin A is at present unknown.

† Varies with the kind; use value given on the container.

Vitamin D. Vitamin D is needed by the body for the proper utilization of calcium and phosphorus in making bones and teeth. The deficiency disease caused by lack of vitamin D is called rickets—a disease which affects the bone formation and which is still too common in this country, especially among infants. While vitamin D is necessary for the proper metabolism of calcium and phosphorus, it cannot make up for a deficiency of these minerals or for the lack of balance in the diet. One of the authors recalls when, as a college student, she was seated in the dormitory dining room, facing a famous painting of a madonna, and that she was disturbed by the appearance of the baby in this picture because he was so badly proportioned. It was not until an article written by Ruhrah appeared in the *American Journal of Diseases of Children* that she realized that in many of the early madonna pictures the babies showed rachitic symptoms. [23] This is attributed to the fact that in those days nothing was known of vitamin D, the anti-rachitic vitamin. Though sunshine was available and probably also fish, the babies in early days wore many clothes shielding them from sunshine, and little or no effort was made to give babies either fish or fish oil.

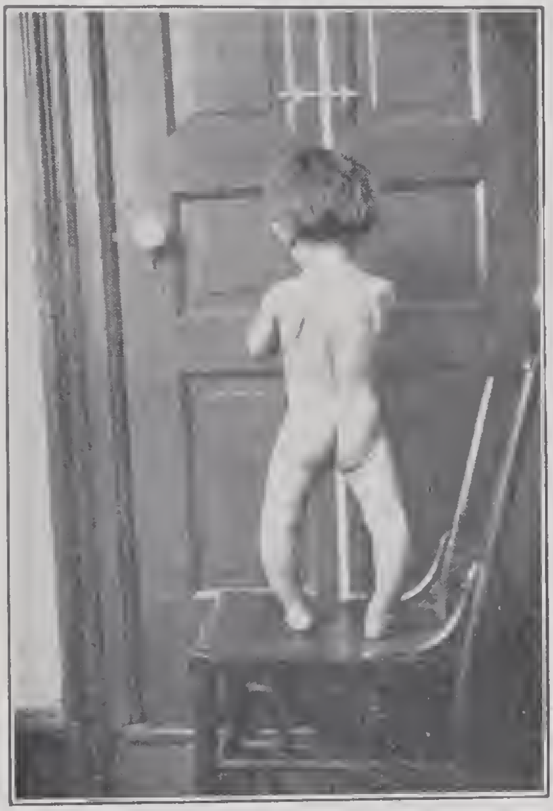


FIG. 10. Rickets in advanced form.

Rickets is still very common in Europe and North America. The disease often is associated with lack of sunshine. It is more prevalent in congested urban areas than where a child has access to plenty of fresh air and direct sunshine.

Rickets is practically unknown in tropical countries, and in temperate climates the occurrence of the disease varies with the season, being more common during the cold season than in summer.

Breast-fed infants are not immune to rickets. Fat babies or babies who gain weight rapidly are more likely to have rickets than those who gain normally. This is true of breast-fed as well as bottle-fed babies. The amount of vitamin D in the mother's milk is dependent upon the mother's diet. It is usually advisable to supplement the breast milk as well as bottle milk with some form of vitamin D or to expose the nude baby to sunshine to insure adequate vitamin D. (For sunbath directions, see page 196.) Premature babies and twins are more susceptible to rickets than full-term, single babies.

Since rickets is a disease of the bones, we look to the bones for symptoms of the disease. Some symptoms affecting the formation of the bones and the cartilage can only be detected by x-ray. However, enlargements at the joints, enlargement of the frontal bone or forehead, flat, square, or otherwise ill-proportioned head, protruding abdomen, bowlegs, flared ribs, misshaped jaw, and Harrison's groove (a depression where the ribs join) may any or all be obvious symptoms of rickets.

Many of these symptoms disappear when proper food is given, but some of the after-effects of rickets may be serious. Deformed pelvic bones may give much difficulty in later years at childbirth. Ill-formed and narrow jaws cause trouble when the teeth, especially the permanent teeth, erupt. Much has been written on vitamin D and the teeth. The relationship seems logical enough because the teeth are part of the bony structure. While vitamin D is essential to good tooth formation, it alone cannot insure normal tooth structure or prevent tooth decay.

Vitamin D is relatively stable. It is not lost in ordinary cooking processes.

Requirements for Vitamin D. According to the National Research Council, the daily allowance for infancy, pregnancy, and lactation is 400 to 800 I.U. The label of vitamin D compounds may state the vitamin D content in U.S.P. units. One U.S.P. unit is equivalent to one International Unit.

There is considerable disagreement as to the amount of vitamin D required at various ages. In our feeding practice we have found it possible to prevent rickets and raise healthy children by starting infants at several weeks of age with one drop of cod-liver oil and slowly increasing this amount so that at 3 months they are getting ¼ teaspoon, at 6 months ½ teaspoon, and at 1 year 1 teaspoon or less; for a normal child never more than 1 teaspoon. In addition to cod-liver oil, all infants not breast-fed are given egg yolk in their formula, beginning at 3 weeks of age. We advise sunbaths when sun is available, and therefore cod-liver oil may be omitted during the summer months.

Healthy adults on an adequate diet should not need the addition of fish oils except during pregnancy and lactation. Perhaps invalids, people on limited diets, and persons whose work keeps them indoors and thus prevents them from getting sunshine should also be added to the list of those needing a supplement of vitamin D. They might get it, however, from fat fish. It is interesting to note that one serving of salmon has as much vitamin D as 1 teaspoon of cod-liver oil of minimum U.S.P. requirement.

Vitamins are relatively new in the field of nutrition, and in most cases we do not know just what the effect of excessive doses may be on human beings.

Throughout the period of the study of vitamin D there have been experiments to test the effects of excessive dosage. Excesses showed harmful effects in humans as well as in other animals. Some of the effects noted on humans were violent nausea, severe headaches, profuse sweating, diarrhea, and loss of appetite. [24] Even though these results were obtained with doses far in excess of the therapeutic dosage, we feel that it is wise to follow a conservative course in taking vitamin D.

Sources of Vitamin D. Sardines, red and pink salmon, cod-liver oil, liver, and egg yolk are good sources of vitamin D.

In fat fish like sardine, salmon, or mackerel, the fat with the fat-soluble vitamins A and D is scattered through the fish so that when we eat the fish we get these vitamins. Lean fish or white fish like cod and halibut have the fat with vitamins A and D stored in the liver; hence we buy cod-liver oil. The shortage of cod-liver oil since the war has made for greater use of other sources of vitamins D and A. Percomorph oil has a much greater concentration of vitamin D and is a good source of vitamin A also. Blue-fin tuna is a percomorph fish. Halibut-liver oil is richer in both A and D than plain cod-liver oil. Salmon oil is found to be comparable with cod-liver oil in vitamin A content and superior in vitamin D. Sunbaths will take the place of fish oils in furnishing vitamin D. Hence it is advisable to use that source of vitamin D whenever available. Sunshine itself is not a source of vitamin D but the sterols, as ergosterol and cholesterol, are activated by ultra-violet light to form vitamin D. Sterols are found in the skin of human beings so that the ultra-violet rays of sunshine on the skin activate vitamin D. The sunshine is less effective on dark skin.

Vitamin D, like vitamin A, is fat soluble and is therefore found in the fat of the food as the yolk of the egg, and the oil of fish. We need vitamin D in indirect proportion to age rather than in direct proportion. In other words, babies and children need more than adults for the bones and teeth of adults are already formed. Therefore it seems inadvisable to make a practice of buying irradiated foods for the family.

Daily allowance of vitamin D, as adopted by the Committee on Foods and Nutrition of the National Research Council, January, 1943, is as follows:

	International Units
Adult	Unknown
Pregnancy	400–800
Lactation	400–800
Infants	400–800

The amount for children and adults is unknown; when not available from sunshine, it should probably be provided up to the minimum amount recommended for infants.

Table 12. Some of the Best Sources of Vitamin D

FOOD	MEASURE	I.U.*
Salmon, red, canned	¾ cup	488
Cod-liver oil	1 tsp	at least 340
Liver, chicken	¼ lb scant	50
Liver, beef	¼ lb scant	45
Liver, pork	¼ lb scant	45
Egg yolk	1 medium	40 †
Liver, lamb	¼ lb scant	20
Liver, calves	¼ lb scant	15
Butter	1 tbsp	10

* Although vitamin D has been shown necessary for adults, the amount has not been determined.

† The amount varies according to the vitamin D content of the food of the chicken.

Vitamin E. Vitamin E has been called the anti-sterility vitamin. This label in no way describes the full function of this vitamin, however. Experiments with rats have proved that a lack of vitamin E in the diet causes sterility and its presence prevents sterility. So far there is no evidence that sterile human beings become fertile when vitamin E is added to the diet, though there is some evidence that vitamin E has proved beneficial in cases of habitual abortion. More facts are needed to prove the value of vitamin E in cases of abnormalities in human reproduction. There is much interest in the fact that vitamin E is necessary for the prevention of muscle atrophy in animals.

Requirement of Vitamin E. The daily requirement for vitamin E is unknown. The most we can say is that its stability under present methods of distribution should insure an adequate supply in natural foods.

Sources of Vitamin E. Whole-grain foods, green leaves, egg, and vegetable oils furnish considerable vitamin E.

Vitamin E is fairly stable to heat but is easily destroyed if the fat containing it becomes rancid.

Vitamin K. Fat-soluble vitamin K (*Koagulations-vitamin* in the German and Scandinavian languages) aids in the clotting of the blood. Experiments have shown that vitamin K differs from the fat-soluble vitamins A, D, and E in that it contains anti-hemorrhagic material. Concentrates containing vitamin K were first extracted from dried alfalfa and later from putrefied fishmeal. The chemical formulas vary slightly for the two substances, and they are called K_1 and K_2. Synthetic K_1 is identical to K_1 as extracted from alfalfa. [25] Since the discovery of vitamin K, substances containing properties similar to those of the pure vitamin have been isolated.

The preparation of a water-soluble anti-hemorrhagic compound has been reported. It is effective given orally without bile salts. [26]

The presence of bile is essential for the proper absorption of natural vitamin K. This has been shown both with humans and with animals. [27, 28]

Repeated experiments have proved that neither vitamin K nor bile salts alone have any effect on hemorrhagic tendency, whereas vitamin K and bile are immediately effective.

Some authorities suggest that mineral oil inhibits the proper absorption of vitamin K. [25]

The vitamin K activity of alfalfa was destroyed in several hours when exposed to light. A large part of the activity of concentrates is destroyed by alkali; also by strong acids. [25]

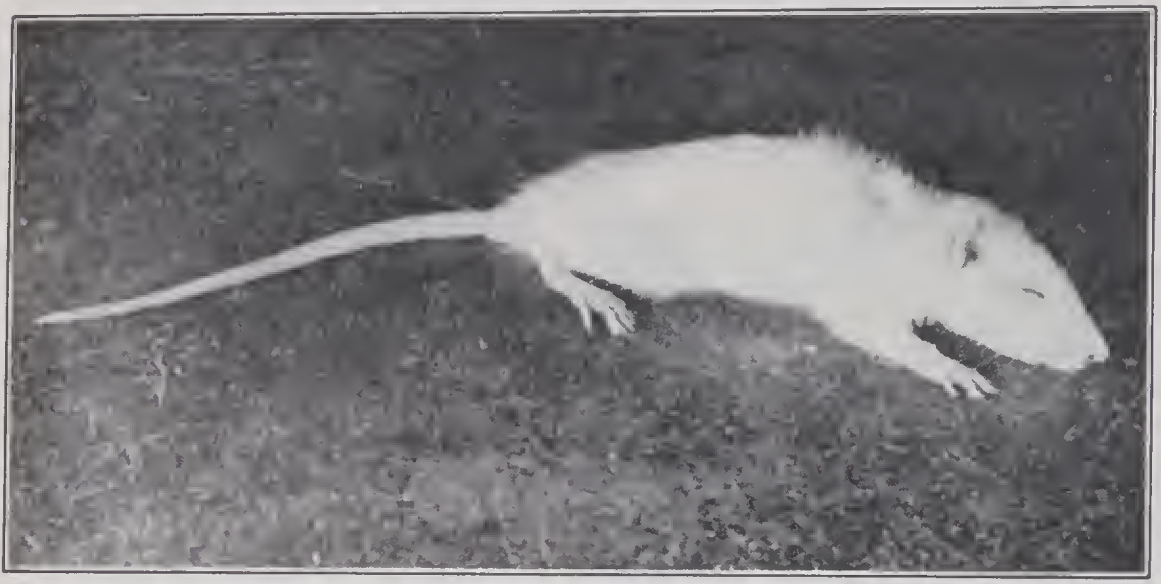
Requirement of Vitamin K. Estimated daily requirements for the normal individual are not yet known. The National Research Council considers that the requirement for vitamin K is usually satisfied by any good diet.

Sources of Vitamin K. Vitamin K is widely distributed in nature, green leaves being the richest source. Large amounts were found in various animal organs studied; liver, however, contained less than the other organs.

Water-Soluble Vitamins

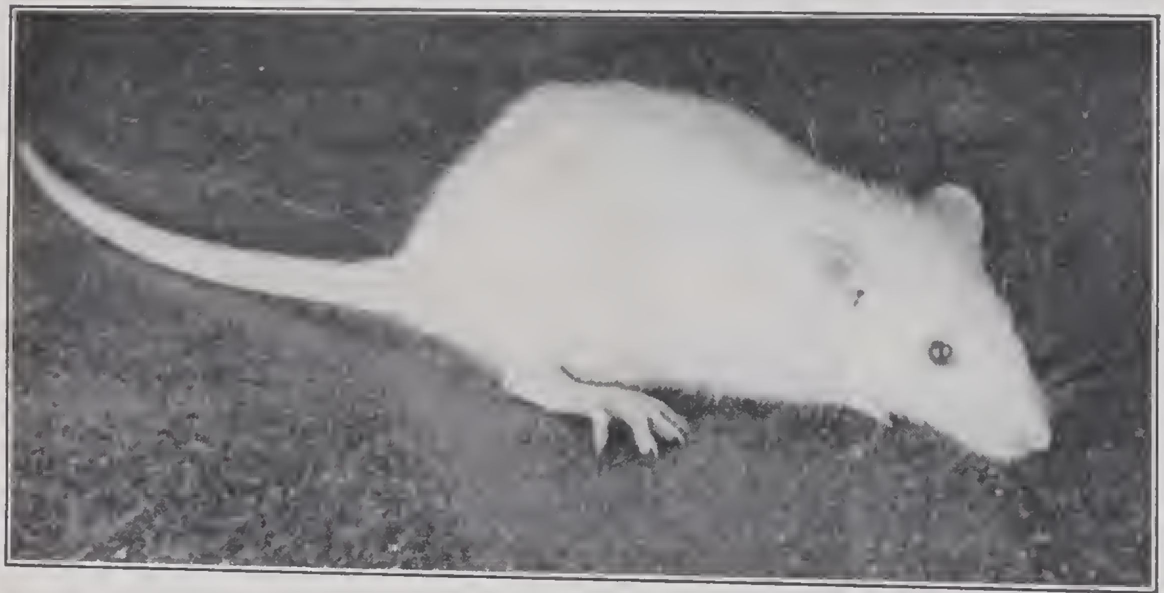
The vitamins which are soluble in water are B_1 or thiamin, riboflavin, nicotinic acid or niacin, and vitamin C or ascorbic acid. What was at first identified as vitamin B has proved to be a considerable group of vitamins now being referred to as the vitamin B complex. Already some seven or eight vitamin entities seem to have been identified in this complex and others are in the offing. There are three vitamins in the B complex now known to be of importance in human nutrition, vitamin B_1 (thiamin), vitamin G (riboflavin), and niacin (nicotinic acid or the pellagra-preventing factor). Work on other vitamin B factors shows their relation to animal nutrition, but as yet little or no relation to human nutrition has been proved; so no discussion on them will be included at this time.

Vitamin B_1 or Thiamin. So much is being learned daily about vitamin B_1 or thiamin that many of the complaints of men, women, and children are being attributed to a lack of it. On the other hand, many of the characteristics we all desire in life are thought to be due to its presence in adequate amounts in the diet. Vitamin B_1 helps with proper functioning of the whole digestive tract, including processes such as digestion and elimination. It plays such an important part in nerve regulation that one scientist has even attributed divorces to its lack in the diet. In addition, vitamin B_1 promotes growth and development, is necessary to successful reproduction and lactation, helps with proper utilization of starches and sugars, prevents and cures beriberi or polyneuritis. There is some difference of opinion regarding the relation of thiamin to appetite. We are unable to say whether thiamin stimulates an already normal appetite or only restores appetite lost because of its lack. There has also been experimental work which seems to show that vitamin B_1 improves the hearing in eighth-nerve, high-tone deafness. [29]



Courtesy of E. R. Squibb and Sons

FIG. 11*a*. Prolonged deficiency of thiamin (vitamin B_1) retards growth in young animals, causes loss of appetite, and results in degenerative changes in nervous system.

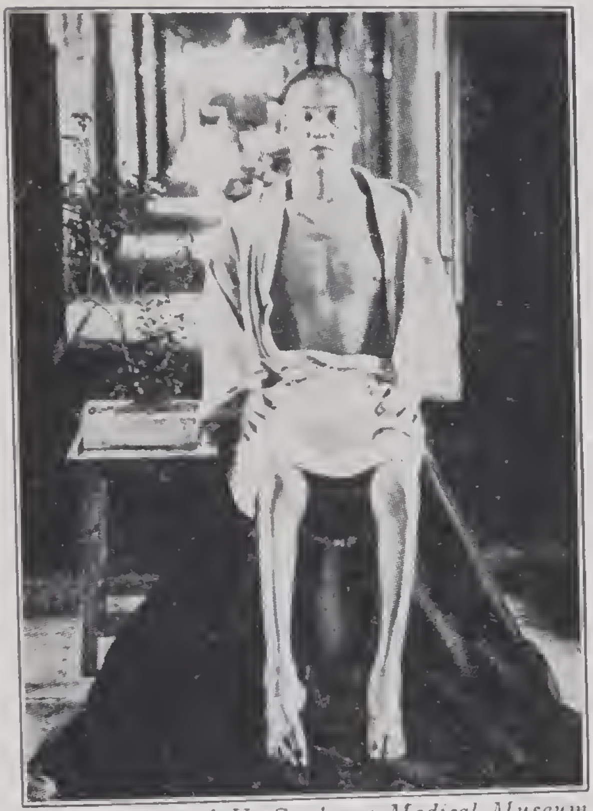


Courtesy of E. R. Squibb and Sons

FIG. 11*b*. The same animal cured by the administration of thiamin (vitamin B_1).

Enthusiasm for the value of B_1 must not be allowed to run away with us, however, for valuable and essential as it is, it is not a panacea for all ills. Nervousness, digestive upsets, dizziness, headaches, underweight, and weariness can be caused also by factors other than lack of vitamin B_1. Do not diagnose your own difficulties and try to correct them by buying vitamin B_1 concentrates at the drug store. Get your vitamin B_1 from food (see Table 13) and let the informed doctor decide if pills are necessary.

The deficiency disease beriberi is due to lack in the diet of vitamin B_1 or thiamin. Beriberi is a Singhalese word meaning "I cannot," signifying that the person is too ill to do anything. It has occurred particularly in the Orient and the Philippines, where polished rice is one of the chief constituents of the diet, but is not unknown in this country. The polishings which are removed to improve the appearance and keeping quality of rice are an excellent source of vitamin B_1. In 1883 beriberi was first shown to be due to dietary deficiency. There was a good deal of beriberi in the Japanese navy. The navy was on a diet of polished rice and dried fish. When this diet was supplemented with meat, vegetables, and milk, beriberi disappeared.



Courtesy of U. S. Army Medical Museum

FIG. 12. Dry beriberi, showing advanced atrophy of muscles of legs.

There are many degrees of thiamin deficiency, and the symptoms may vary in severity accordingly. In the early stages the symptoms of such deficiency may be fatigue, stiffness, headache, nervousness, and loss of appetite. Other deficiency disorders may occur simultaneously. Loss of appetite, due to inadequate thiamin, reduces the food intake which may lead to other dietary unbalances. The heart and the nervous system may be involved in advanced stages of thiamin deficiency to a degree where the control of muscles is affected and there is a lack of muscular coordination. This deficiency disease can be prevented and ordinarily can be cured by a well-balanced diet.

Vitamin B_1 (thiamin) is water soluble and is destroyed by heat in the presence of moisture—the destruction is more rapid in an alkaline solution. Thus it is more easily destroyed in cooking peas than in cooking tomatoes. Since tomatoes have a relatively small amount of B_1 or thiamin, it seems unwise to add soda when cooking them, as is often done in making cream of tomato soup. There is reason to believe that vitamin B_1 or thiamin is not destroyed in freezing. Like all water-soluble vitamins, if the cooking water of fresh, frozen, or canned vegetables is discarded, much of the vitamin is wasted.

Requirement of Vitamin B_1 (Thiamin). Since vitamin B_1 definitely is needed in the metabolic processes, the amount required is dependent upon the energy intake and the body weight. In other words, the more physical work we do, the greater our need for thiamin.

There is not sufficient evidence to state definitely the body requirement for vitamin B_1 or thiamin. Various studies give a range of 85 I.U. to 700 I.U. daily. These values, however, were not obtained from balance studies. [30] For exact adult requirements we must wait for more accurate clinical studies. The National Research Council recommends for adults 1.2 milligrams to 2.3 milligrams or 400 I.U. to 766 I.U. daily, depending upon the weight and activity of the individual. Children under 12, taking fewer calories, naturally require less, while active adolescent boys may require as much as or more than a man. (See the following page.)

Sources of Vitamin B_1 (Thiamin). This vitamin is so widely distributed in natural foodstuffs that diets in this country, if well selected, should meet the body needs. Those of us who listen to the radio have probably at some time or other heard, "Put B_1 in your breakfast," with this or that food.

To be sure, all whole cereals and whole-cereal breads contribute vitamin B_1 or thiamin, but lean pork, ham, and glandular organs such as heart and liver are better sources. Legumes, such as peas, beans, and lentils, and some fresh vegetables, such as green peas, green corn, asparagus, and Brussels sprouts, are good sources. However, if one uses refined cereals and discards the water in which vegetables are cooked, two good sources of vitamin B_1 or thiamin are lost from the diet. Meat and eggs, two other sources, are relatively expensive, so that people on low incomes may find their diets deficient in vitamin B_1 or thiamin unless they know how to choose food. Particularly families on low incomes should be taught to select largely whole-cereal breads and to use the water from cooking vegetables in the gravy or soup.

Vitamin B_1 is not stored in appreciable amounts in the body, and so for health protection an ample daily supply is necessary. Plants have the ability to manufacture it, and it is stored in the seed. Refining processes which remove the bran and the germ of the seed reduce or remove the vitamin B_1 or thiamin content. The use of polished rice and of bread made of refined white flour decidedly lessens the vitamin B_1 or thiamin content of the diet. It is because of the extensive use of white flour in the American diet that the government has recently advocated "enriching" white flour with vitamin B_1, iron, and niacin (nicotinic acid) since only 2 or 3 per cent of the flour milled is whole-wheat flour.

The daily allowance of vitamin B_1 (thiamin), as adopted by the Committee on Foods and Nutrition of the National Research Council, January, 1943, is as follows:

	International Units	*Milligrams* *	*Micrograms*
Adult	400–766	1.2–2.3	1,200–2,300
Pregnancy	600	1.8	1,800
Lactation	750	2.3	2,300
Infant (approximately 6 to 18 months)	135	0.4	400
Pre-school	200	0.6	600
School (5 to 12 years)	300–400	0.8–1.2	800–1,200
Adolescent	400–766	1.2–2.3	1,200–2,300

* 1 milligram of thiamin equals 333 I.U.

Table 13. Some of the Best Sources of Vitamin B_1 *(Thiamin)*

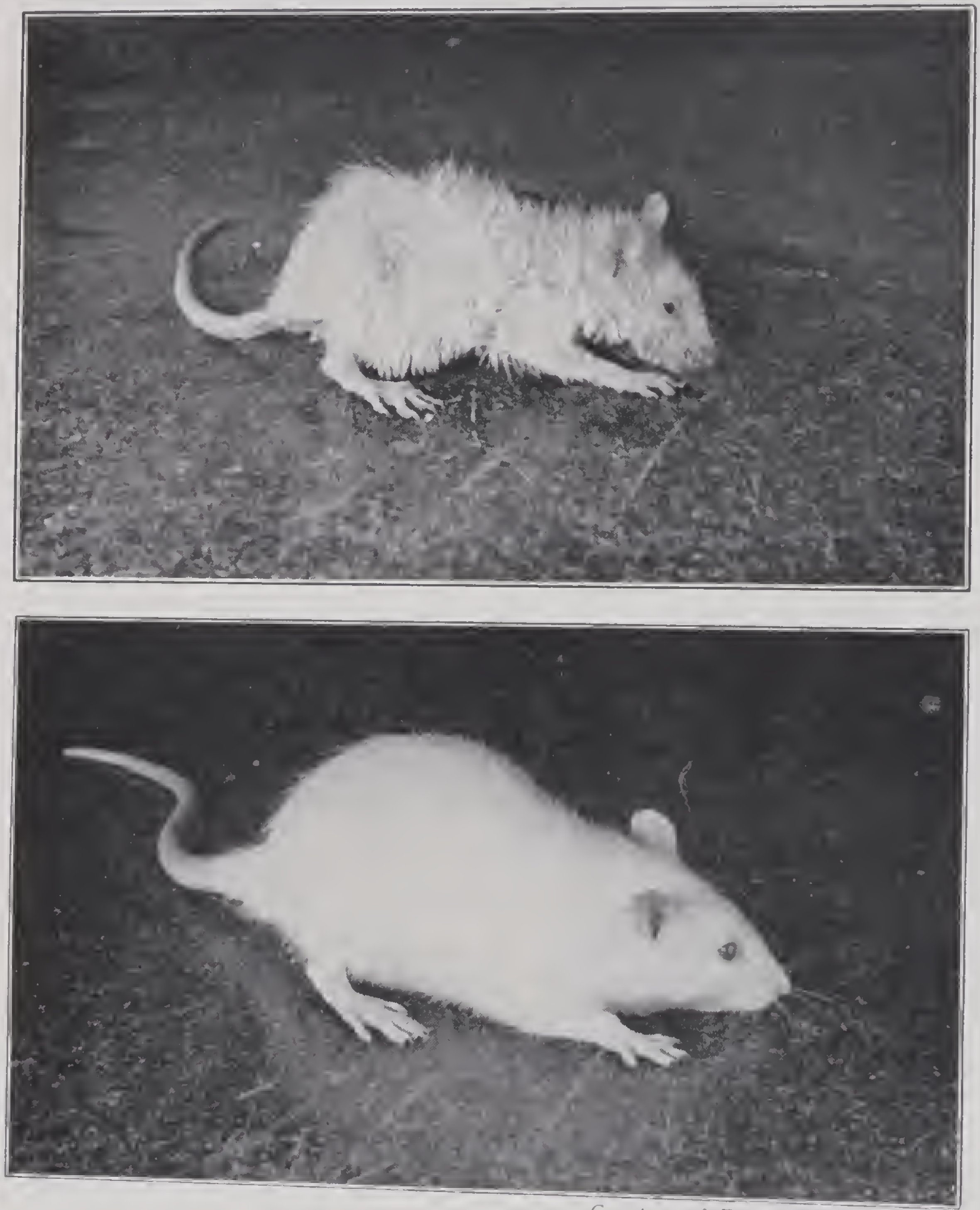
FOOD	MEASURE	I.U.	MICROGRAMS
Pork chop	1 medium	400	1,200
Ham, smoked, lean	3.5 oz	370	1,100
Heart, beef	¼ lb scant	200	600
Brazil nuts	12 medium	158	475
Corn, green	2 ears 6″ long	115	344
Hazel nuts	¼ cup	110	330
Peas, green	½ cup	90	280
Whole-wheat bread	3 slices	83	250
Beans, lima, dried, cooked	½ cup	85	225
Liver, beef	3.5 oz	85	225
Asparagus	5 stalks 7½″ long	70	210
Brussels sprouts	5 to 6 sprouts	60	180
Beans, navy, dried, cooked	½ cup	55	170
Pecans	6 to 12 nuts	50	147
Shredded Wheat	1 biscuit	50	146
Peanut Butter	1 tbsp	20	56

Riboflavin (Vitamin G or B_2). This vitamin, which has been called lactoflavin, flavin factor, vitamin G, and riboflavin, is now known as riboflavin. This identifies it chemically.

Riboflavin is necessary to promote growth and well-being. A deficiency of this vitamin retards growth and causes skin and eye trouble, loss of hair, digestive disturbances, nervous depression, cracking of the lips, and a shortening of the serviceable years of life, those years between the time one reaches adulthood and the onset of old age.

The deficiency disease is called ariboflavinosis. The importance and extent of this disease is not yet known.

In the absence of riboflavin in the diet, experimental animals lose their hair, and the skin, especially around the ears, nose, and mouth, becomes inflamed and swells. A similar condition may be noted in the eyes (see Fig. 13). In later stages the ends of the toes darken, become dry, and finally drop off. Reports have been made of humans on riboflavin-deficient diets, showing similar symptoms, especially those of cracked lips and of sores at the corners of the mouth. Riboflavin deficiency is undoubtedly



Courtesy of E. R. Squibb and Sons

FIG. 13. The rat in upper picture shows the effect of riboflavin deficiency; lower picture shows rat restored to normal after receiving a sufficient amount of riboflavin.

more prevalent in the United States than we had formerly supposed. This is probably because its symptoms are so similar to those of pellagra.

Riboflavin is a water-soluble substance. It is destroyed by exposure to light and by high temperatures, especially when in alkaline media.

Requirement of Riboflavin. The daily requirement for riboflavin, according to Elvehjem (1938), is 1 to 2 milligrams. [31] The National Research Council allows 1.8 to 3.3 milligrams per adult per day. The requirement for children is somewhat lower. If one is on a diet with an abundance of natural foods, there is little possibility of a deficiency because riboflavin is widely distributed in natural foods.

Sources of Riboflavin. Kidney, liver, heart, milk, beet greens, spinach, turnip greens, kale, and egg are good sources. Most fruits and vegetables contain some riboflavin, but green, leafy vegetables tend to be the best source from plants, and glandular tissue the best animal source.

The daily allowance of riboflavin, as adopted by the Committee on Foods and Nutrition of the National Research Council, January, 1943, is as follows:

	Milligrams	*Micrograms*
Adult	1.8–3.3	1,800–3,300
Pregnancy	2.5	2,500
Lactation	3.0	3,000
Infant (approximately 6 to 18 months)	0.6	600
Pre-school	0.9	900
School (5 to 12 years)	1.2–1.8	1,200–1,800
Adolescent	2.0–3.0	2,000–3,000

Table 14. Some of the Best Sources of Riboflavin

FOOD	MEASURE	MICROGRAMS
Kidney, beef or veal	¼ cup, cubed	2,100
Liver, beef	¼ lb scant	1,800
Liver, pig	¼ lb scant	1,800
Liver, calves	¼ lb scant	1,650
Liver, lamb	¼ lb scant	1,650
Heart, beef	¼ lb scant	900
Milk, whole, fresh	1 cup	549
Beet greens	½ cup	450
Soybeans, dried	¼ cup	450
Spinach	½ cup	375
Turnip greens	½ cup	360
Beans, lima, dried	¼ cup	378
Egg	2 medium	330
Kale	½ cup	300
Cheese	2, 1″ cubes	300

Niacin (Nicotinic Acid). Niacin (nicotinic acid or pellagra-preventing factor) has a dramatic effect in curing pellagra. The word pellagra means "rough skin." Niacin is one of the products of oxidation of nicotine. However, smoking or chewing tobacco does not contribute niacin to the body. One of the first symptoms of the disease pellagra is dermatitis or roughness of the skin. Other symptoms are digestive disturbances with a sore mouth, inflammation of the tongue, diarrhea, and nervous depression.

Many cases occur in certain areas in the United States, particularly among the poor people in the South. There diets were found to be primarily deficient in niacin (nicotinic acid); they were also low in other food nutrients, especially in thiamin and riboflavin.

Niacin is effective in preventing and curing pellagra.

Requirements of Niacin (Nicotinic Acid). The daily requirement of nicotinic acid, according to Elvehjem (1938), is 10 to 25 milligrams for the average individual. [31] Munsell (1939) gives 3 to 7.5 milligrams daily. [32] According to the National Research Council, the daily allowance for adults is 12 to 23 milligrams. Allowance for children is somewhat less.

Sources of Niacin (Nicotinic Acid). Liver, chicken, rabbit, salmon, haddock, lean muscle, green peas, tomato juice, turnip greens, and milk are good food sources.

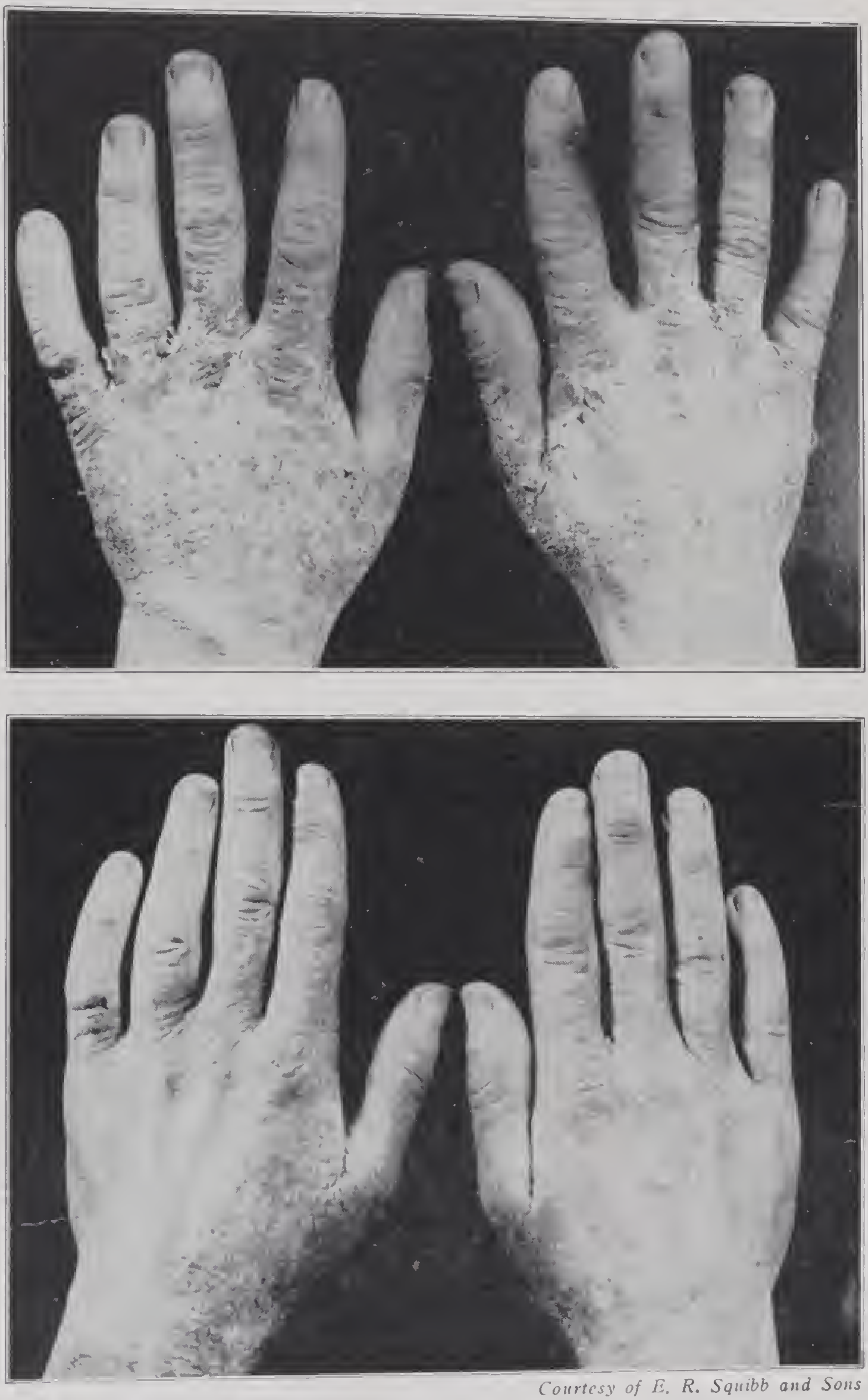
The daily allowance of niacin (nicotinic acid), as adopted by the Committee on Foods and Nutrition of the National Research Council, January, 1943, is as follows:

	Milligrams
Adult	12–23
Pregnancy	18
Lactation	23
Infant (approximately 6 to 18 months)	4
Pre-school	6
School (5 to 12 years)	8–12
Adolescent	12–20

Table 15. Some of the Best Sources of Niacin

FOOD	MEASURE	MILLIGRAMS*
Liver	3 slices 2″ × 1″ × ¼″	15.0–20.0
Chicken	2 slices 4″ × 4″ × ⅛″	10.0
Salmon	¾ cup	6.0
Haddock	1 piece 3″ × 1½″ × 1″	5.0
Beef, fresh	1 slice 2½″ × 2½″ × 1″	4.0
Pork, lean	1 large chop	3.0–4.0
Peanut meal	½ oz	2.1
Milk, whole	1 cup	2.2
Spinach	½ cup	1.5

* The vitamin nature of niacin is of recent discovery. The values given above are the best estimates from existing data. Eggs, tomatoes, green peas, kale, turnip greens, fresh fruits, and enriched bread are also sources of niacin (nicotinic acid).

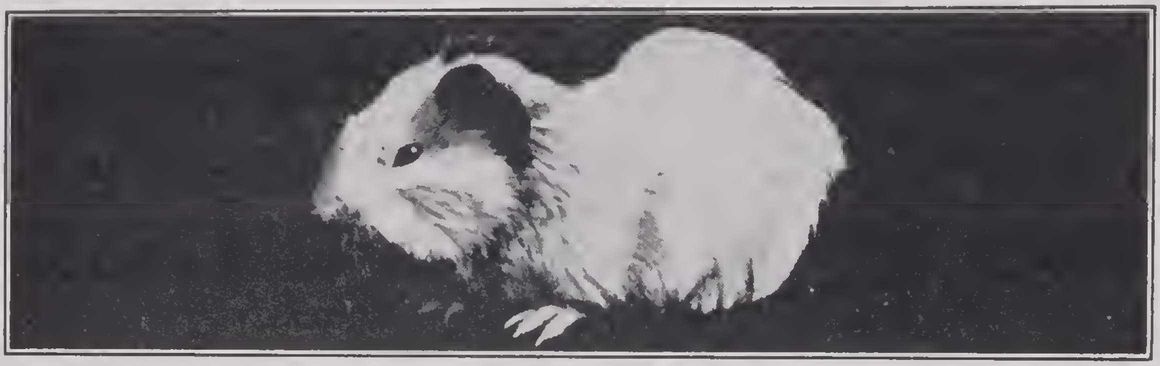


Courtesy of E. R. Squibb and Sons

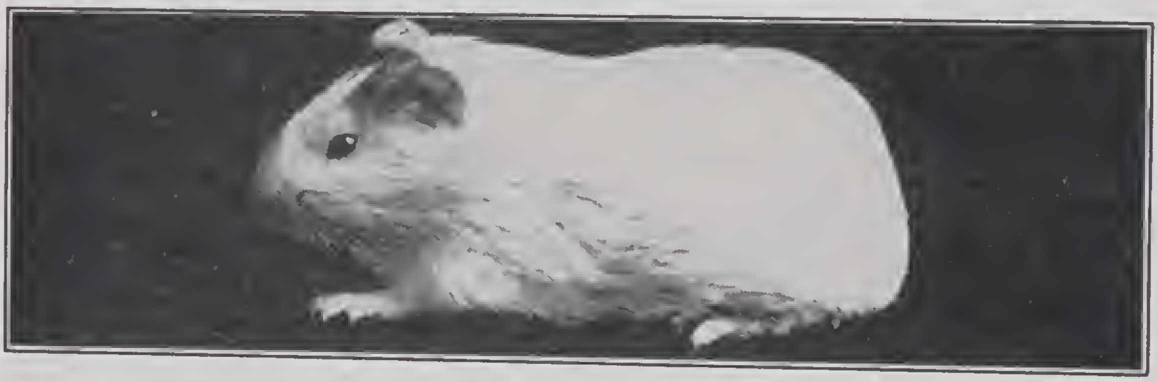
FIG. 14. The hands of a pellagra victim which were cured by the use of niacin.

Vitamin C (Ascorbic Acid). Years ago the only way we knew of the word scurvy was from Shakespeare's quotation, "You scurvy villain." Just what a scurvy villain was, I think, none of us quite realized; yet the picture presented was something terrible. Later, as scurvy was studied and the symptoms recorded, we could easily imagine what a dreadful-looking specimen a person with severe scurvy might be. He would be thin from loss of weight, he would walk queerly because of pains in his joints, and he might show black and blue spots from the slightest injuries, owing to hemorrhages under the skin. His gums would be swollen and bleeding, his teeth loose, and he might even have lost many of them. As this pale, anemic-looking person wobbled toward you, you would hear him panting from shortness of breath before you saw him. If his condition were sufficiently severe, you might expect him to have convulsions and even be delirious.

Twin Brothers, 6 Months Old



This one had no vitamin C and developed scurvy. Note the rough fur and crouched position due to sore joints.



This one had plenty of vitamin C. It has sleek fur and is healthy and alert.

Courtesy of Bureau of Home Economics, U. S. Dept. Agr.

Fig. 15. The effect of vitamin C on guinea pigs.

Today, owing to our advanced knowledge of nutrition, scurvy in its severe type is very uncommon. Unfortunately, however, many persons in the modern world still suffer from what might be termed scurvy in its "milder forms," such as loose teeth, sore, swollen, and bleeding gums, and fleeting pains in the joints. These same people probably turn black and blue from the slightest bruise. They are likely to be restless, irritable, and feel "generally low." Perhaps what is often called "spring fever" may be partly or wholly a result of low vitamin C intake.

Many of us may remember that as children we had oranges only on the Christmas tree, that no special effort was made to use tomatoes, and that through the long winter months fresh fruits and vegetables were practically unknown. Is it possible, therefore, that some of the "growing pains" of that time were due to vitamin C deficiency? A friend tells us how his mother every spring gathered wild greens for her family which she called "scurvy grass."

Scurvy is the deficiency disease caused by lack of vitamin C, ascorbic acid. In the past this disease was common among persons on diets that were restricted in fresh foods. This was true for sailors, soldiers, and prisoners. In fact, there was a notable outbreak of scurvy in World War I.

The Canadian Indians were probably the first to discover a cure for scurvy. In 1535 Jacques Cartier began to lose men from scurvy while wintering on the St. Lawrence River. An Indian advised an infusion of spruce needles for the illness and this proved very effective in curing the disease.

English sailors were called "limeys" because they used limes on long voyages to prevent scurvy.

It is well known now that the citrus fruits, such as oranges, lemons, grapefruit, and tangerines (also tomatoes and green vegetables), prevent as well as cure scurvy.

Research shows that many difficulties other than scurvy result from a diet low in vitamin C. Some animals manufacture their own vitamin C, but men, guinea pigs, and monkeys must obtain it from food. Much has been learned as to what happens to the vitamin C in the guinea pig. The newer experimental techniques make it possible to use humans as subjects.

The bones and teeth need vitamin C (ascorbic acid). Studies with guinea pigs have shown that, in the absence of vitamin C, the jelly-like substance which surrounds the dentin of the teeth and the marrow of the bones becomes thin and watery. Wounds heal slowly on a diet low in vitamin C even though there is no infection present. There is also some evidence that vitamin C plays a part in the rapidity with which surgical wounds heal. If the milder symptoms of vitamin C deficiency are not cured, not only the bones and teeth but also the blood system may be affected. Nor will this result simply in hemorrhages, but the damage will progress to the point where the blood cannot adequately resist infections.

Requirement of Vitamin C. There are three methods for arriving at the body's requirement for vitamin C. The first is the capillary-resistance test, which measures the strength of the capillaries; second, the vitamin C content of the urine, which, when subtracted from the amount taken into the body, shows the amount used; and third, the vitamin C content of the blood.

In spite of the rapid development of these three methods of studying vitamin C, there is still some uncertainty as to the best amount of vitamin C needed for people of various ages. In view of the body needs for vitamin C other than for preventing scurvy and since this vitamin is not stored by the body, it seems wise to receive a generous amount daily. Roughly the range of daily requirement thus far determined is, for adults, 25 to 100 milligrams of ascorbic acid, equivalent to 500 to 2000 I.U. of vitamin C. The daily allowance recommended by the National Research Council is 75 milligrams of ascorbic acid or 1500 I.U. per adult man, with somewhat less for women, except during pregnancy and lactation when it is more. Children's requirements vary with the age of the child. Some believe the requirement of vitamin C increases with such diseases as colds, tuberculosis, rheumatic fevers, and whooping cough.

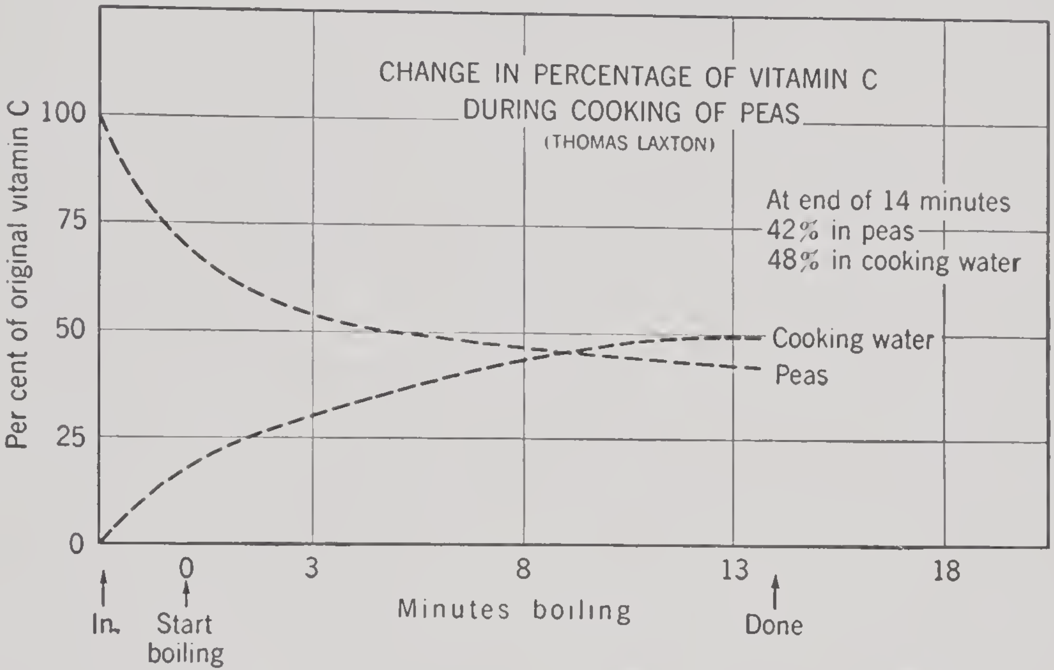
Sources of Vitamin C. Some of the best sources of vitamin C (ascorbic acid) are greens, such as turnip, dandelion, and spinach, and citrus fruit, such as oranges, grapefruit, tangerines, lemons, and tomatoes.

Other fruits and vegetables, such as strawberries, cantaloupes, pineapples, and green peppers, yellow sweet potatoes, cauliflower, and cabbage, are good sources. The vitamin C content of these foods varies with the length of time they are exposed to the air and with the method used in cooking them. Vegetables fresh from the garden have more vitamin C than after standing, and the longer they stand the more vitamin C is lost. Also, vitamin C is less stable in an alkaline medium.

Vitamin C (ascorbic acid) is water soluble; therefore, as with vitamin B_1 (thiamin), the cooking water may contain considerable amounts and should be used when possible. Some vegetable water, such as spinach, is palatable with just a little salt and lemon juice. Foods that are exposed to the air lose their vitamin C through oxidation. Vitamin C in food is easily lost, especially if stored at room temperature. [33] If orange juice is extracted and allowed to stand a long time, the vitamin C potency is lessened.

A study on the vitamin C losses from cooked peas showed that about one-half of the vitamin C passed into the cooking water, that the greatest rate of loss occurred during the first 2 minutes of cooking, that a few minutes over or under cooking was not an important factor, and that the loss of vitamin C during standing of the drained, cooked vegetable at room temperature was relatively small and seemed to take place during the first few minutes.

A study of the cooking losses of Swiss chard also showed that about one-half of the vitamin C passed into the cooking water and that the greatest rate of loss was during the first few minutes of cooking. The authors explained this by the fact that the enzyme which activates the oxidation of vitamin C is inactivated during the first few minutes of cooking. [34, 35] Figure 16 shows the changes in the percentage of vitamin C during the cooking of peas.



Courtesy of Fenton, Tressler, and King, Jr. Nutr.

FIG. 16.

The vitamin C (ascorbic acid) content varies with the variety of plant; also with the soil upon which the plant is grown. Certain varieties of tomatoes contain double the quantity of vitamin C that others do, grown on the same soil under the same conditions. Several varieties of spinach have been found to be 50 per cent richer in vitamin C when grown on upland soil than the same varieties grown on muck soil with otherwise similar conditions. Fall spinach was also richer in vitamin C than spring-grown spinach.

Although freezing shows little destruction of the vitamin C (ascorbic acid), the processes preparatory to freezing and slow defrosting may cause much loss. [36]

Vitamin C (ascorbic acid) is less stable in an alkaline medium. Therefore soda should not be added when cooking vegetables; the more soda added, the more vitamin C is lost.

On the other hand, if treated in a vacuum, orange juice can be concentrated. During the World War in 1942, to facilitate the transportation of orange juice, especially abroad, the juice was concentrated by evaporation under a vacuum. The ascorbic acid content of this product was reduced only slightly. The finished product contained more than 90 per cent of the ascorbic acid that was in the original juice. No sugar or preservatives were added to the juice. The flavor varied; some compared favorably with fresh orange juice and some, depending upon the variety of orange used, was rather bitter.

Table 16. Some of the Best Sources of Vitamin C

FOOD	MEASURE	INTERNATIONAL UNITS	MILLIGRAMS *
Turnip greens	½ cup	3,000	150
Dandelion greens	¾ cup	2,000	100
Peppers, sweet, green	1, 3″–4″ long	1,760	88
Orange	1 medium	1,700	85
Spinach	½ cup	1,500	75
Brussels sprouts	5 to 6 sprouts	1,500	75
Strawberries	¾ cup	1,500	75
Kale	½ cup	1,250	63
Cantaloupe	½, 5″ melon	1,200	60
Beet greens	½ cup	1,000	50
Lemon juice	½ cup	1,000	50
Cauliflower, chopped	½ cup	1,000	50
Cabbage, new	¾ cup	900	45
Orange juice	⅖ cup	900	45
Grapefruit juice	⅖ cup	900	45
Grapefruit	½ cup	860	43
Tomato	1, 2″ diameter	460	23
Tomato juice	½ cup, scant	450	19
Tangerine	1, 2″ diameter	350	18

* One milligram ascorbic acid is equivalent to 20 I.U.

Cooking, curing, pickling, and salting tend to destroy vitamin C. Therefore, if depending upon a food for vitamin C: (1) Have foods as fresh as possible, picked from garden and eaten soon after. (2) Cook food as short a time as possible. Use the water in which it was cooked or canned. (3) When using oranges, grapefruit, or lemon for juice, squeeze them as near the time of using as possible. Both time and temperature are important factors in preserving vitamin C.

The daily allowance of vitamin C (ascorbic acid), as adopted by the Committee on Foods and Nutrition of the National Research Council. January, 1943, is as follows:

	International Units	*Milligrams*
Adult	1,400–1,500	70– 75
Pregnancy	2,000	100
Lactation	3,000	150
Infant (approximately 6 to 18 months)	600	30
Pre-school	700	35
School (5 to 12 years)	1,000–1,500	50– 75
Adolescent	1,600–2,000	80–100

Other Vitamins

At the time this is written (1942) other vitamins have been investigated. Their value in human nutrition has not been conclusive. There may be other vitamins not yet discovered. A diet of natural foods, designed to meet the body needs, would no doubt furnish them all.

The vitamins discovered, but not yet identified with human nutrition, are B_3, B_4, B_5, B_6 (pyridoxine), H, M, vitamin P (citrin), pantothenic acid, factor W, filtrate factor, anti-gray hair factor, choline, and the "grass-juice" factor. [10]

Table 17. Parts of the Body Primarily Affected by Vitamin Deficiencies

Eyes	Vitamin A, riboflavin
Ears	Vitamin B_1 (thiamin)—related to high-tone deafness
Nose	Riboflavin
Nasal passage	Vitamin A
Lips	Riboflavin
Teeth	Vitamins D, A, C (ascorbic acid)
Skin	Riboflavin, niacin, vitamin C (ascorbic acid)
Hair	Vitamin C (ascorbic acid), riboflavin
Bones	Vitamins D, C (ascorbic acid)
Muscles	Vitamin E
Blood	Vitamins K, C (ascorbic acid)
Nerves	Vitamin B_1 (thiamin), niacin
Digestive tract	Vitamin B_1 (thiamin), niacin, riboflavin
Heart	Vitamin B_1 (thiamin)
Reproductive organs	Vitamins A, B_1 (thiamin), and E

The discovery of the grass-juice factor has brought to the fore the story of Nebuchadnezzar, who went mad 2500 years ago. He was put out to graze in the grass of the field, where he was restored to sanity, and reports say "his hair grew like eagles' feathers." Some now attribute the cure to the grass-juice factor, but perhaps fresh air, sunshine, freedom from worry, and outdoor exercise may all have contributed their part to his cure.

Our population will continue to suffer from lack of minerals and vitamins unless special attention is given to include them in the diet. Many people are suffering from serious deficiencies, and a large proportion from mild deficiencies. Border-line cases of deficiency diseases are very common and usually go undiagnosed but take their toll in lowered health and vigor.

If you do not feel up to par, first look to your diet. Consult the lists of sources of vitamins and minerals to see that your diet includes one or two foods which are high in those lists. Check whether your diet is too rich, that is, whether it contains too much of fat, sugar, or protein. If your diet is right, consider your nervous disposition and your exercise. Calm yourself. Put on hiking clothes and get some fresh air by a good walk or by gardening in summer.

Water

Water, though not usually thought of as food, is essential for health and well-being. More than half of the human body is composed of water. Not only the fluids of the body but all the tissues need a certain amount of water. In most body processes water is involved, as in digestion, circulation, respiration, metabolism, and elimination. The body is constantly losing moisture as a result of the processes of respiration, perspiration, and elimination, and this loss is increased when temperatures are high and muscular exercise is considerable. This loss must be replaced. Much water is obtained from our food. Milk, tea, coffee, and soup are composed largely of water. Fruits and vegetables contain a high percentage of water. Bread is about two-fifths water and dry beans are one-tenth water. In addition to water in food, we should take a certain amount of drinking water each day. The actual amount of water needed by the body is unknown. The amount varies with temperature, kind of food eaten, humidity, and individual activity. Thirst is probably the best guide; so water should be made available for people of all ages.

Water at Meal Time

For some reason many of us have grown up with the idea that water should not be taken with the meal. Experiments, however, show that water taken at meal time is not harmful but is definitely beneficial. It increases the flow of digestive juices and increases the action of the enzymes, that is, the action necessary to digestion.

Cellulose

Cellulose, the fibrous part of plants, is a type of carbohydrate. It is a part of all fruits, vegetables, and whole cereals. The fibrous section of an orange is cellulose. A considerable amount of it therefore is consumed when vegetables, fruits, nuts, and whole cereals are eaten. Cellulose is not appreciably broken down by the enzymes of the human body but passes through the digestive tract and is eliminated in the feces. The presence of cellulose in the intestinal tract aids the rhythmic action of the intestine, which is called peristalsis, and is necessary for regular elimination. Mineral salts and organic acids and gases also aid peristalsis. Too much cellulose may prove irritating to the lining of the digestive tract and cause serious difficulties, especially with children. For this reason baby's whole-grain cereals, his fruits, and his vegetables are strained.

The amount of cellulose in the diet, just as the various foodstuffs, should meet the needs of the individual. Bran is almost entirely cellulose and for this reason cannot be tolerated by many individuals. Its use is tabooed by most reputable physicians as a food for human beings. In cases of digestive disturbances or when convalescing from sickness, it is usually wise to use fruits and vegetables as juices or strained.

Balance

All food substances needed by the body are equally important even though required in widely differing amounts. Although the body may require only about 1.2 milligrams (400 I.U.) of vitamin B_1 or thiamin daily, no one would question that it is just as important as protein, of which the daily requirement is almost 6000 times as great (70 grams). Therefore, it is unwise to become too concerned over any one food, unless it is deficient or in excess to a dangerous degree. It takes a variety of foods in balance to build a strong, healthy body. (For an example of a day's balanced diet, see Table 21, page 98.)

The importance of balance is one of the more recent discoveries in the nutrition of human beings as well as of animals and of plants. Balance in nutrition has often been destroyed by enthusiasm for and unwise use of new and important findings of research because of overemphasis of the newly discovered truths.

At the present writing vitamin knowledge is going ahead by leaps and bounds, and it is not unusual to find people running to the store to buy this or that vitamin supplement. The question is, what may be happening to the balance of the diet? Little research has been done on the effects of excess of any one food.

An illustration in plant life is the use of nitrogen in the production of apples. If a deficiency exists, the addition of nitrogen greatly increases the vigor of the tree and the yield of apples. The benefits are so vivid that some persons have overdone the application of nitrogen, which results in poor color and poor keeping quality of the apples.

The first general education in the field of nutrition given the public dealt with calories. It was then generally accepted that if your calories were right your nutrition was right. Now we hear comparatively little about calories. Yet they are as important to proper nutrition today as they ever were. Calories still supply us with energy which we need, but we now know that it is possible to consume sufficient calories and still die of starvation.

During the early part of the twentieth century there was considerable controversy between scientists regarding the amount of protein one should consume. Much kidney trouble was attributed to high protein intake. Many cut the protein of the diet to a minimum. This was particularly true of those with kidney trouble and of pregnant women. Pregnant women, especially those troubled with edema, were advised to eat sparingly of meat, eggs, and sometimes even milk. This resulted in an unbalanced diet. Breast feeding declined and anemia of mothers was prevalent. This is not surprising since protein foods such as liver, egg yolk, and lean meat supply considerable iron. Some recent experiments show that toxemia of pregnancy is reduced and not increased by an adequate protein diet. [37] Other experiments show that the ability of mothers to nurse their babies is increased if the protein, especially animal protein (and, according to one experiment, animal proteins high in cystine) is high during both pregnancy and lactation.

Even milk, which is frequently called our most nearly perfect food, can be overemphasized. It is an excellent food, needed principally for its calcium, which is difficult to get without milk, but should not be used to the exclusion of other necessary foods. Many mothers try to get their children to drink a quart or more of milk daily. Some succeed but frequently to the exclusion of other necessary foods. Milk in excess may displace in the diet foods rich in iron. This happens so frequently with younger children that we speak of "milk anemia." It results from lack of balance. This may be the reason why Elvehjem found that of 750 infants coming to the child health centers in Madison, Wisconsin, approximately 21 per cent became anemic during the first year of life. [38]

An unmarried woman, reporting to a nutritionist for advice about her diet, said that her physical examination showed nutritional anemia. She took plenty of fresh fruits and green vegetables, and liver once a week; yet she tired easily and had frequent colds. Analysis of her diet showed the only questionable point to be an excess of milk (1½ to 2 quarts daily). She was advised to reduce the milk to a pint and to include more green vegetables, apricots, and fruit juices. Several months later she reported much improvement.

Many mothers tend to keep infants and even pre-school children on a diet chiefly of milk and cereal. This is a good foundation for the diet but these foods alone are not sufficient. They must be supplemented with other foods to supply the nutrients they lack. Hemoglobin studies have been made with anemic rats on milk and cereal diets. Cream of Wheat caused no increase in hemoglobin, whereas whole-grain cereals caused a moderate rise. The addition of inorganic iron, copper, and manganese to the milk caused a greater increase. Milk and cereal are good foods and may well be used for one meal in pre-school years, but not for the entire daily intake. [39]

It is also possible to get too little of a needed foodstuff. A college student had frequent nose bleeds, did not like the milk or green vegetables served in the college dormitory and ate little of them. She got less than an egg a day and liver only once a week. When at home on a better diet, the nose bleeding decreased. She was advised to drink one pint to one quart of milk daily, to get an egg daily, and to eat green vegetables when they were served. On this regimen her condition improved. Her diet apparently was low in calcium, phosphorus, and vitamin K.

The baby pictured in Fig. 10 reminds one of the authors of the time she was called to consult with a mother about the feeding of her five-month-old baby. During the consultation, the mother held upon her lap her first daughter, Gladys, aged 18 months. After finishing the discussion about the baby, the mother said, "Now, will you please tell me what I can do about Gladys?" As she spoke, she stood Gladys down, and it was surprising to see how very bowlegged she was. As the old saying goes, "A pig could have run between her legs."

The question, "What are you feeding her?" brought the answer, "We are feeding her according to your bulletin." "Does she get cod-liver oil?" "Yes, one teaspoon a day." "How much milk does she get?" "She won't take milk," the mother replied. "Then you are not feeding her according to the bulletin, which says that a child must take milk. One of our students will come down to show you how to get Gladys to take milk."

It was also suggested to the mother that she take the child to the clinic for infantile paralysis patients and ask them if they could help massage the child's legs into shape. She was shown how they might do it in order to make her feel comfortable about taking the child to the doctor. Three months later the mother brought the child back and, standing her upon the desk, said to the nutritionist, "Look at Gladys now." It was a thrilling sight to see the child standing on perfectly straight legs. It was revealed later that the mother "fearing infantile paralysis" had not taken the child to the clinic but had massaged the child's legs herself each night and morning for weeks. Gladys was also taking her milk at each meal. Later this child entered our Nursery School and it was noted that she had just as good coordination of leg muscles and bones as any child in the group. Bowed legs are a rachitic symptom and may be caused by lack of balance of calcium, phosphorus, and vitamin D. This child apparently had too little calcium and phosphorus because she was not taking milk. (See Fig. 17.)

Some parents think that, if a small amount of a food is good, more is better. One mother asked about her adolescent boy of 16 who was underweight. The father and mother were especially fond of fruits and vegetables and therefore had a diet composed mainly of these foods. No thought was given to the calorie-high foods; even potatoes were seldom included. Fruits and vegetables are excellent foods, but it would be difficult for an active adolescent boy to eat enough to get his calories without an excessive amount of bulk. Much bulk may easily cause abdominal ptosis or stretching and sagging of the abdominal muscles.

Perhaps we "overdo" our favorite foods. One friend said, "The doctor finds out what food you like best and takes it away from you." It is possible that by overdoing your likes you have produced some physical derangement.

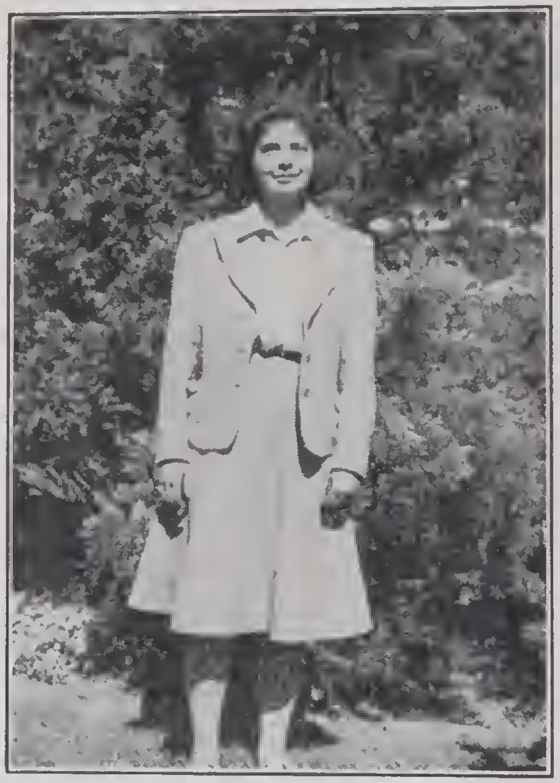


Fig. 17. Gladys, whose legs became straight as a result of good diet and massage.

Today we hear much about vitamins. They are essential to good health, but vitamins alone cannot produce a healthy individual. Vitamin research has dealt mostly with deficiencies. Therefore all the earlier reports stressed lack of vitamins. Little research has yet been done on the effects of excessive vitamins; it is just beginning. These essential substances may act as a two-edged sword. Too much as well as too little may be distinctly harmful. Vitamin capsules and concentrates should be taken only on prescription of a qualified physician. If adults tell you that they or their children take excessive amounts of a certain vitamin and it has no ill effects, do not be too sure this is the truth. They cannot know just what is going on inside and they have not lived a lifetime.

The public has followed fashions in nutrition. First there was the fashion of calories. Then followed proteins, then calcium, and then vitamins. All are important considerations. To make any one a fashion is likely to overdo it and destroy balance in the diet.

The interplay of foods in nutrition is a relatively new idea in both plant and animal nutrition. There is some interplay of constituents so that one substance is dependent upon the presence of one or more other substances in order to be well utilized. Thus vitamin D aids in the utilization of calcium and phosphorus in the body. Also one substance may counteract or destroy the value of another. A short time ago it was discovered that less of the calcium in spinach is available than the calcium in kale. This is due to the presence of oxalic acid in spinach. A calcium oxalate is formed which cannot be utilized by the body.

Rancid fats tend to destroy fat-soluble vitamins A and E. Any fat becomes rancid eventually, but those well utilized by the human body, like butter and cod-liver oil, become rancid easily and therefore should be bought fresh and protected against rancidity by storing in a cool, dark place. [40]

There is thought to be some relationship between calcium and iron metabolism. Just what that relationship is we cannot say at present.

These are a few of the interrelationships that have been found. Others, possibly more important, may be discovered in the future. Because of these types of interplay, any one dietary constituent cannot be considered by itself. It must be considered in relation to the other elements.

Body Processes As Affecting Nutrition

Food, basic as it is to nutrition and to the regulation of body processes, may be useless, unless the body processes are functioning normally. In order, therefore, that the reader may recognize normality and the factors affecting it, it is important that we include at this point a brief discussion of these body processes, such as digestion and elimination.

Digestion

What happens to the food we eat? Our diet may contain all the food essentials but the value our body receives from them depends upon the degree to which this food is digested and absorbed. Many factors influence the process of digestion: the kind of food itself, its smell, taste, and texture; the cooking process to which it has been subjected; how well it is masticated, and the nervous and physical condition of the individual.

When people smell food, they frequently say, "Oh, that makes my mouth water." Appetizing food taken into the mouth does the same thing. Thus we might say digestion begins with the smell and taste of food, for they start the flow of the digestive juices in the mouth and stomach. The flow of these juices is essential because digestion is affected by the supply of digestive juices. Some substances, such as water, meat juices, dilute acids, and fruit juices, are especially good for stimulating the flow of the digestive fluids. Hence the customs of serving boullion, fruit juice, or fruit cocktail at the beginning of a meal and water with the meal should be encouraged.

In the mouth the food is masticated so that it can be thoroughly mixed with the digestive juices. The ease with which foods are masticated depends largely upon the method of preparation of the food. Too high cooking temperatures toughen protein foods. We have probably all seen beautiful amber-looking toilet articles made from the protein of milk. Amber color is fine in toilet articles but not in fried eggs. However, it is well to have some foods that require a good deal of chewing.

Each of the digestive juices contain enzymes which play their part in the digestive process. A digestive enzyme is a chemical compound which causes a chemical transformation or breaking down of foods. Saliva contains the enzyme ptyalin (salivary amylase), which acts upon the starches and dextrins. Thus the digestion of potatoes, rice, bread, and other starchy foods begins in the mouth.

The masticated food passes from the mouth, through a tube called the esophagus, into the stomach. The walls of the stomach are elastic so that it can receive relatively large amounts of food at a time. It is sometimes called a reservoir or storage space because food stays in it for a longer or shorter time, depending upon the amount and kind of food eaten.

The gastric juice of the stomach is acid. When the food reaches the stomach and becomes acidified by this juice the salivary action stops and stomach or gastric digestion begins. Because the gastric juice is acid, the stomach is sometimes called a "disinfecting station." The disinfecting value is somewhat questionable, however, because of the short time the bacteria may be in contact with the acid and because of the varying size of food particles. The gastric juice of the stomach acts principally on the proteins. There is also a fat-splitting enzyme in the stomach, but its activity is usually rather limited.

The length of time food stays in the stomach differs with the kinds of food. Pure carbohydrates leave the stomach in the shortest time, proteins second, and fats third. A mixture of fat with either carbohydrates or proteins is retained in the stomach a longer time than either carbohydrates or protein alone or together. Therefore, in a mixed diet, the higher the proportion of fat, the longer the food remains in the stomach. There are circumstances where this may prove advantageous since one feels "hunger pangs" when the stomach is empty. If one feels hungry before the next meal, perhaps he should include more fatty foods in his diet or eat oftener.

Liquids leave the stomach more quickly than solid foods. The finer the food particles, the quicker they leave the stomach, whether broken up by mastication or before being taken into the mouth. Because the infant has no teeth for mastication and his stomach is too small to act as a reservoir, and since the membranes of his digestive tract are delicate, his solid foods should be strained.

The method of preparation of food may speed or retard digestion. Insufficient cooking or overcooking may make food more difficult to masticate thoroughly. It is generally believed that foods fried in fat until crisp usually stay in the stomach longer than foods prepared by such methods as boiling because they are not broken up so finely in mastication and because of the fat absorbed in frying. Also, an irritating substance called acrolein may be formed by overheating fat. If you have ever been in a room where fat is being overheated you may feel this irritation on the eyes and throat.

Probably the greatest part of the digestion and absorption of food takes place in the intestines. The intestines, including small and large intestines, are a long tube economically coiled around in our insides so as to occupy little space. This tube, if taken from an adult and stretched out, would reach the length of a 24-foot room.

When food comes from the stomach into the upper end of this tube—the small intestine—it largely has been reduced to a liquid. Here digestion on all foods is carried forward to completion or near completion. Food is gotten ready for absorption into the blood stream by the digestive action of three juices—the pancreatic juice, the intestinal juice, and the bile. The action of these intestinal digestive juices continues even into the large intestine. The small intestine has the largest surface for the absorption of food, that is, taking in the end products of digestion and carrying them into the blood stream. In order to increase the absorption area, nature has provided marvelously many small finger-like projections (villi) along the inner walls of the intestines. Not all food is completely digested in the small intestines, but the remaining material, including partially digested foods and non-digestible material, passes into the large intestine, and further absorption of the digested products takes place. Thus the material remaining unabsorbed gradually becomes drier until it takes on the nature of feces and is eliminated as such. In cases of diarrhea, food is hurried through the intestines too rapidly and a more liquid or watery stool results.

In normal digestion all these processes go on with no difficulties. Digestive disturbances may be caused by faulty functioning of some internal organ or poor food habits. Much of poor digestion, however, is due not to so-called "indigestible foods" but to weakness in function caused by lack of some essential foods. This might be due to a lack of some one food essential, as vitamin B_1 or thiamin, to riboflavin, or to a general lack of balance. Digestive disturbances may be due to a tired and nervous body that does not function properly. Excitement, fear, and fatigue all tend to inhibit the flow of digestive juices. Do not expect food to digest with ease if you are nervously upset or physically tired. Check your diet, including both the food consumed and its preparation. Omit foods which are difficult to digest. Usually highly concentrated foods, foods rich in fat, or those which ferment easily are the ones to avoid. Try a simple diet of milk, fruit juices, egg, white toast, refined or strained cereals. If the difficulty does not disappear consult a physician. Do not buy pills or listen to the radio for cures.

Elimination

Waste material must be eliminated from the intestinal tract. The waste material which is not absorbed and returned to the intestines by the blood is excreted as feces. Muscular contraction, called peristalsis, is necessary for the passage of this material.

Excessive accumulation of waste material in the intestinal tract causes discomfort. Headaches and some other difficulties were formerly thought always to be due to toxins which were absorbed into the body. Apparently this is not the cause because the trouble disappears as soon as the rectum is cleared. Packing the rectum with cotton results in these same symptoms. Probably the difficulty is caused by pressure on nerves. [41] Diet, exercise, and calm environment all play a part in the proper removal of this waste matter.

Apparently much of the world has learned the laxative effects of bulk, roughage, or cellulose, found in whole cereals, vegetables, and fruits, hence the all-too-prevalent use of bran for cereal and in breads and biscuits. In fact, a few years ago one of the authors became so concerned over this practice with many nursery school children that she wrote to a number of famous pediatricians, general practitioners, and nutritionists to obtain their opinion with regard to its use. In general, the use of bran was termed "a very bad practice."

Undoubtedly people generally are not aware that there are other better stimuli to peristalsis. A baby, never taking cellulose, usually has one or more movements daily.

Foods other than bran also possess laxative properties and aid in the proper removal of waste from the body. These are foods containing certain minerals, or organic acids or foods which by fermentation produce organic acids and gas. Organic acids are present in tomatoes, fruits or fruit juices, and buttermilk. Minerals and cellulose are found in large quantities in vegetables, fruits, and whole cereals. Beans, cabbage, onions, honey, and molasses are gas-producing foods, but excessive amounts may cause discomfort. Raw apples, usually considered laxative, seem to be constipating to some people. Apples should be cooked if raw apples prove troublesome. Water also is considered a decided aid to elimination.

Alvarez, of the Mayo Clinic, says that many physicians find that individuals who are otherwise normal but suffer from constipation, resulting from inadequate bulkiness of the diet, develop irritable colons if bran is taken in excessive amounts for a short time or in smaller doses for longer periods. [42] Hence it seems inadvisable to use bran as such. The amount in whole-grain cereals or breads should be sufficient.

Cellulose is not the only dietary factor aiding elimination. While cellulose does increase the muscular movement of the intestines, it should be used in moderation. An excess tends to irritate the lining of the intestines and thereby often causes more harm than good.

One bowel movement daily is usually considered normal, but occasionally individuals vary from this without harmful effects. Improper elimination may result in blotchy complexion, headaches, stomach difficulties, or other discomforts.

If constipation cannot be corrected by food, water intake, and exercise, a physician should be consulted. Drugs cannot remove the cause of the trouble and therefore should not be used regularly.

Other Factors Which Affect Nutrition

Although food is basic to man's very existence and rightly chosen food is one of the most important influences affecting man's health, there are other factors which must be considered if he is to be a healthy individual. Environment, fresh air and sunshine, exercise, and sleep are all factors contributing to health.

A Calm and Happy Environment

To illustrate the effect of worry on nutrition: A cat was eating peacefully and apparently enjoying her food until a dog appeared. Then the cat's fur bristled, and she lost her interest in food. Physiologists, testing the digestive juices of this cat, found that they had decreased decidedly in amount when the dog appeared.

Most of us have experienced times when we feel frightened, nervous, or upset and therefore cannot digest our food. We feel as though we had a lump in our throat and our stomachs go 'round and 'round. It is unfortunate that the guest speaker must eat a banquet before he speaks. For if he tends to be nervous with his decreased digestive juice he would be better off to eat little or no food. It is probably also because of this decreased digestive flow (saliva) that the "tongue cleaves to the roof of the mouth." Hence we furnish the guest speaker with water.

Because nervousness and worry inhibit the flow of the digestive juices, a pleasant environment is desirable. Parents should refrain from nagging and scolding children. Discussing problems of the day and irritating subjects should also be avoided at meal time. Relax and make the meal time a pleasant time which the whole family enjoys. Give your food a chance to be of the most use to you by allowing digestive juices to flow freely.

A calm environment is necessary not only at meal time but at all times in so far as it is possible. Not everything runs smoothly every day. Learn to reckon with that fact; do all you can to remedy it and then forget about it. Frequently we can do much more than we realize to keep the home environment happy. Learn to sing, hum, or whistle as you work. It might be helpful, as was formerly the custom and still is in some homes, to start the day with a song or hymn in which all members of the family participate.

Fresh Air and Sunshine

Fresh air and sunshine are essential to good health. Oxygen of the air, we might say, is the key that unlocks the calories. In other words, the energy locked up in foods cannot be released unless there is oxygen present to combine with the carbon of the food. Not much is known about the effect on humans of too little fresh air within normal limits. We do know, however, that if one is locked in an air-tight room he will die regardless of how perfectly selected his food may have been. A stuffy atmosphere tends to make one feel drowsy. Therefore rooms should be well ventilated day and night. This does not mean to sleep with the windows thrown wide open when the temperature is below zero or when the wind is blowing a gale. It is true, though, that we feel more peppy and rested in the morning if we have slept in a room where the air has circulated rather than been allowed to become stale and stuffy.

It is possible that colds result from continually overheated houses and lack of fresh air as well as from lack of vitamins. It is a good practice to include ½ to 1 hour of outdoor exercise daily.

Sunshine is definitely beneficial to humans. The ultra-violet rays of the sun activate the sterols of the skin and change them into vitamin D. The sunshine itself does not contain vitamin D. Those who spend much time out of doors tend to be more healthy than those who do not. This is probably partly due to the effect of the sun's rays on the supply of vitamin D, but there may be other equally important effects of fresh air, sunshine, and exercise.

Rickets at one time was thought of as a disease confined to congested residential areas. It may occur anywhere but is more common in slum districts because of lack of sunshine and proper food.

In India rickets is practically unknown among the children of mothers of the lower castes. These mothers take the babies with them while they work in the fields which gives them plenty of fresh air and sunshine. On the other hand, women of the higher castes enter "purdah" at marriage (remain in the houses except for short excursions). Babies remain with the mothers until they are able to walk and so get little sunshine. Rickets is more prevalent among these babies. [43]

It is possible also that much of the excellent results reported from many of the old "grape cures" abroad are attributable to the exercise in the fresh air and sunshine, where patients were asked to pick their own grapes from the mountain side.

Sleep and Rest

A form of adult punishment is to prevent the subject from sleeping until completely exhausted. This shows how the body and mind can suffer from lack of sleep.

Individuals vary in the amount of sleep their bodies require. Each person should be able to determine his own requirement. Insufficient sleep may result in loss of weight, irritability, or a haggard facial expression.

Food cannot take the place of sleep. In fact, an overfatigued body cannot make the best use of the food consumed. Some persons find it best to rest one or more periods during the day rather than to try to get all their rest at night. One works more efficiently if he rests or relaxes whenever he begins to feel fatigued. Experiments with factory workers show that they work more efficiently if time is allowed for relaxation.

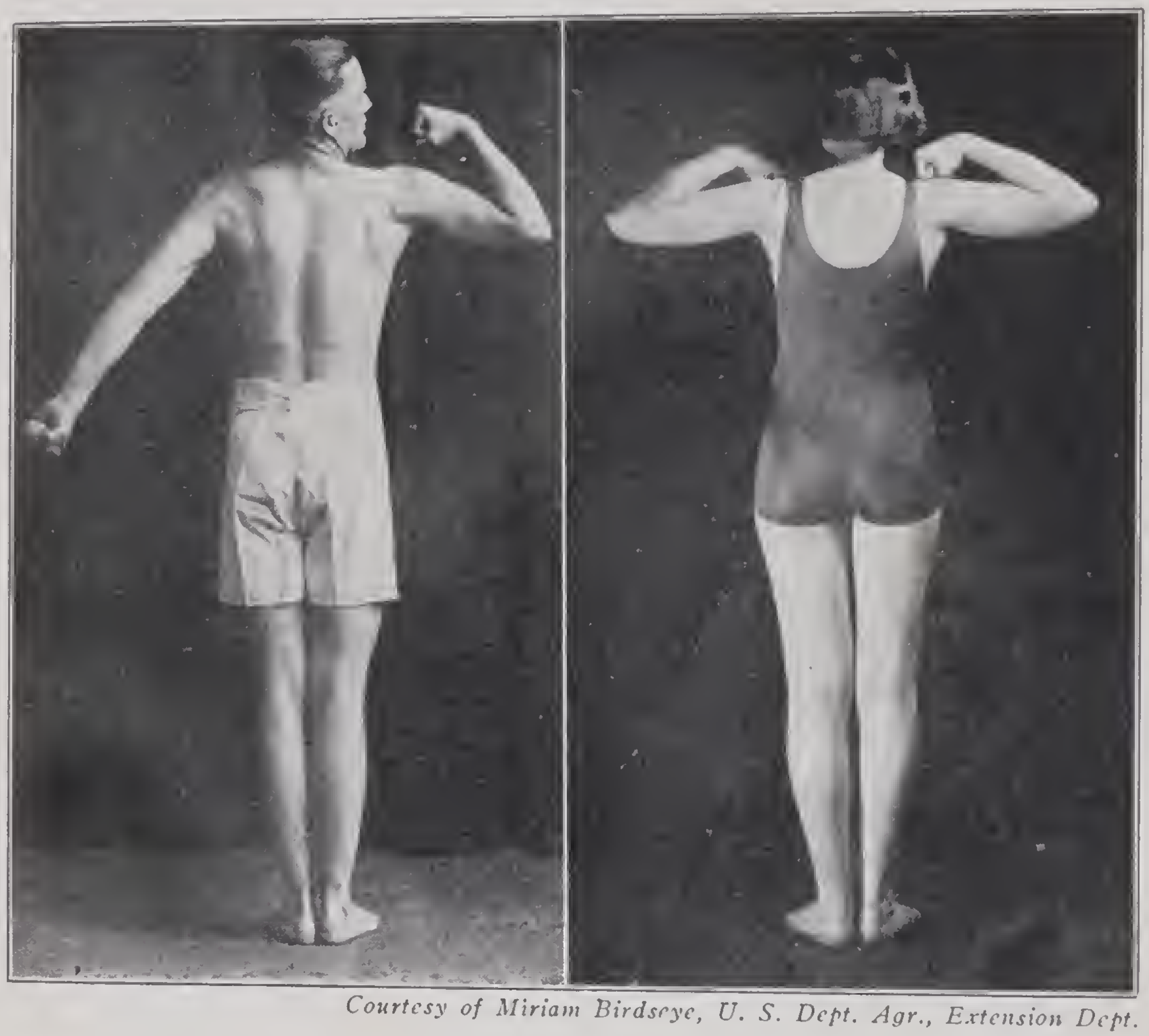
Less sleep may be needed as one grows older because of decreased physical activity. However, for the very old, the amount of sleep becomes as important as for the very young. The term "second childhood" may be well stated because a ninety-year-old person, for example, may eat, sleep, and react much as a nine-month-old baby. Children need much sleep. There are tables giving hours of sleep desirable for children of various ages, but they should be used only as a general guide. Children as well as adults vary in their sleep requirement. A child will get the amount of sleep he needs if you let him; that is, if you put him to bed on time and give him a nap if he needs it.

Exercise

Exercise is needed to keep the body in good physical condition.

We should get some exercise in the form of either work or play each day. There are many forms of exercise, and the type used depends upon one's state of health and age. Infants get most of their exercise from kicking, stretching, wiggling, and crying. Later it comes from creeping and getting into what many mothers call "all manner of mischief." Children and younger persons usually indulge in more strenuous exercise than older persons.

Babies should not be deprived of exercise because it is necessary for normal development. The story of two neighboring children of the same age illustrates this point. Mrs. White was afraid to let her baby on the floor for fear he would take cold. The baby lacked exercise and so was fat and had poor color and frequent colds. Mrs. Brown's baby, on the other hand, crept all over the place. He had good firm flesh, good color, and walked earlier than the White baby. At 14 months of age he had had no colds. It is possible that the better results with the baby who was allowed to creep were due partially to exercise.



Courtesy of Miriam Birdseye, U. S. Dept. Agr., Extension Dept.

Fig. 18. Two well-nourished individuals.

It is also possible to overdo exercise, especially after illness. Children in particular should be protected from too violent exercise for too long a time. A child by himself seldom overexercises, but a group of other children or adults, promoting an ambitious program, may lead him to overdo.

Symptoms of Good Nutrition

Every individual should realize that there are certain measuring sticks of good health which he can easily use. If some one came into the room and you looked up and saw a well-proportioned person with an alert look, clear rosy complexion, glossy hair, bright eyes, who walks with a spring in his step, who speaks feelingly, stands erect, and is of a happy disposition, you would say, "That looks like a well-nourished person." These are symptoms of good nutrition which every individual can observe. Upon further investigation, you would probably find that he feels well, eats well, sleeps well, and has good digestion and proper elimination.

Weight and Height

Weight in relation to height is used more frequently by laymen as a measure of health than any other. It is information easy to obtain and furnishes a tangible measure of one's well-being.

One's weight in relation to height in usually judged either by checking a height-weight table or merely by appearance. Height-weight charts have been used extensively as weight guides for adults as well as for infants and children. These charts are made by taking the average height and weight of many individuals. They should be used as an approximate guide only, for no one individual should expect to measure up exactly to an average figure. Occasionally tables give a range of 20 per cent for normal weight.

The general appearance of a person is affected by his weight. Good appearance is an asset to any individual. Aside from the health aspect, appearance is often a factor in obtaining positions. The general opinion seems to be that movie actors, as a group, tend to be underweight. In checking the weight of 22 Hollywood stars, selected at random, it was interesting to find that 16 were of average weight for their height.

If dissatisfied with your appearance, study your figure. Prominent bones, ribs easy to count, and shoulder blades resembling wings call for a little padding of fatty tissue. Rolls of fat, especially at the waistline, indicate the need for reducing.

Weight is affected more by food consumption than any other one factor. Exercise and food consumption must be in balance or else weight tells the story.

Weight is also affected by the type of bony framework. This is principally a matter of inheritance but food is partially responsible, as indicated by the increase in stature of children of Oriental descent living in this country. The majority of people has a medium-bony structure. There are, however, individuals with a light framework who are tall and slender.

They may be healthy and well nourished even though their weight is as much as 10 per cent less than the average figure on the chart. Then there are the large-built individuals, who are stocky. They may weigh 10 or 15 per cent above the average figure and still be well proportioned. (See Fig. 19.)

Owing to this difference in build, a range of weight from the average for each height and age is allowable. The range is usually 7 to 10 per cent below the average figure and 10 to 15 per cent above. It is well for a young person to weigh a little more than average, but after the age of 30 an excess of weight is undesirable. (See Fig. 20.) Because of this, some weight charts now give the weight to only 30 years.

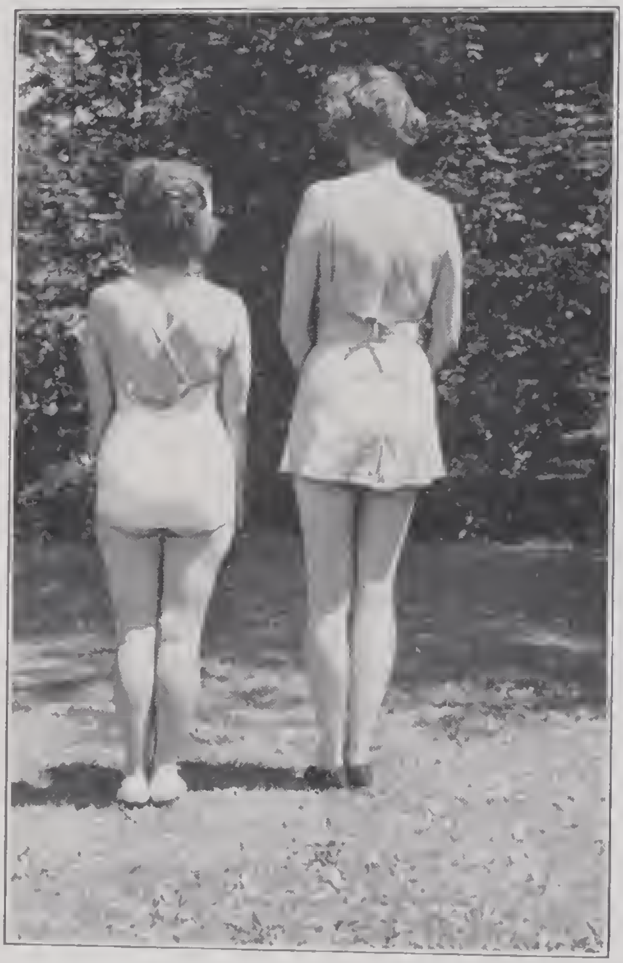


FIG. 19. Tall linear contrasted with short stocky individual.

As one grows older there are bodily changes taking place that affect food consumption and weight. The adult of middle life tends to be less active, the muscles less flexible, and the bones more rigid. There is also a slowing down in the body processes. This means that our body actually requires less food than it did when we were younger and more active. We are creatures of habit, and too many of us continue as we grow older to eat the same amounts and kinds of food. The stomach is an elastic organ and will stretch to the amount of food that is eaten regularly. Many persons need to acquire the habit of eating less as they grow older. The result of overeating may be overweight. The diseases which frequently accompany overweight are the ones which occur more commonly after maturity. It is recommended that the thirty-year-old weight be maintained but not increased.

Certain symptoms are common to persons definitely over- or underweight. The underweight tends to be nervous, irritable, and tires easily.

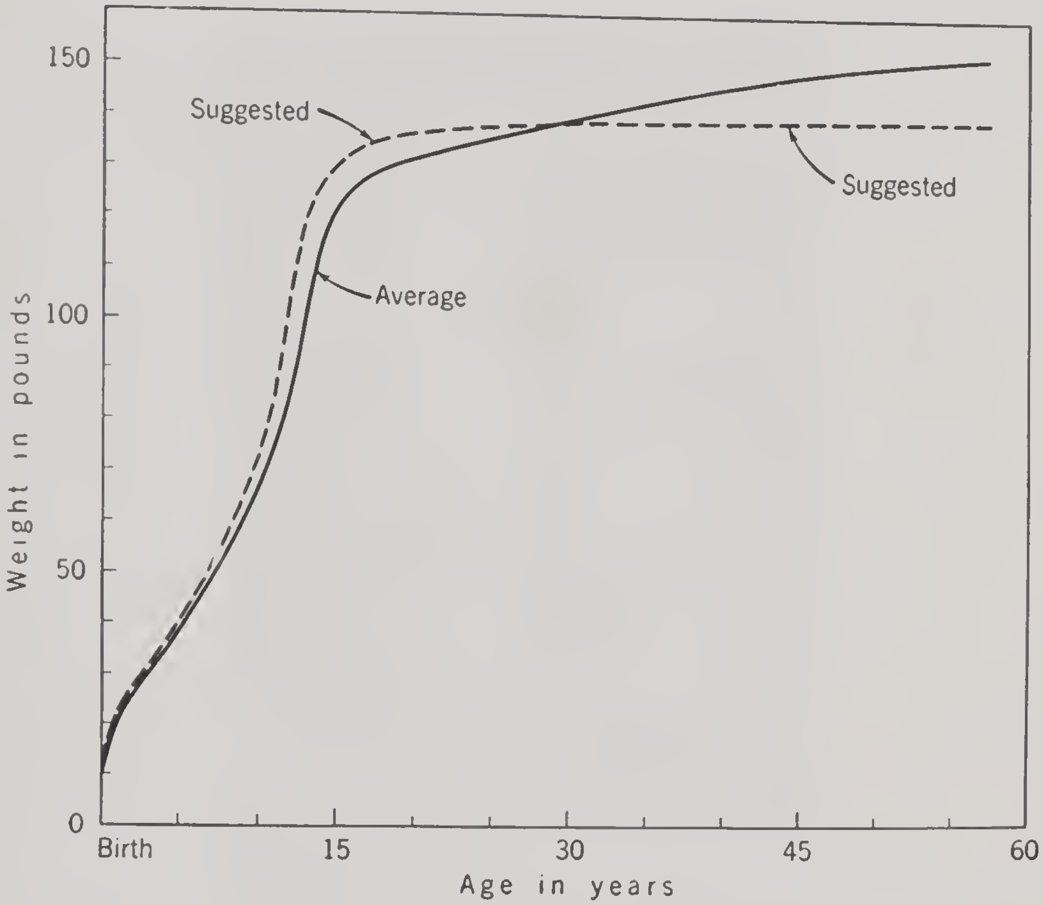


Fig. 20. Increase in weight from birth to maturity. Height 66 inches at maturity.

These symptoms may be especially serious in parents because of the effect on the children under their care. The underweight person often lacks sufficient tissue to support the abdominal organs. He seems to be more susceptible to some diseases such as tuberculosis.

The overweight person, on the other hand, may also tire easily because he must carry extra weight, and no weight is as expensive to carry as overweight because we are paying for food to keep up a deposit of fat, which is not active tissue. He tends to be less active. An overweight child may lose interest in active play and prefer to watch rather than participate when games are being played. Diseases such as diabetes, diseases of the heart, blood vessels, and kidneys often accompany overweight.

Do not merely make excuses for your weight and then do nothing about it if it needs attention. If you tend to be underweight do not say, "I'm just like Dad," and never give it another thought. Upon investigating such cases we may find the cause to be poor food habits rather than inheritance. Poor food habits may be passed from one generation to another. When all or most of the members of the household are overweight, the homemaker should check her menus carefully. Perhaps a diet of too many high-calorie foods such as fats, sweets, rich gravies, and sauces is the cause, and, if so, do not blame grandfather! If diets are well balanced, we find less tendency to crave high-calorie foods.

Table 18. Height-Weight Table for Men and Women of Medium Framework

	MEN				WOMEN			
	AGE							
	15	20	25	30	15	20	25	30
Height	Weight							
4 ft 8 in.					101	106	109	112
4 ft 9 in.					103	108	111	114
4 ft 10 in.					105	110	113	116
4 ft 11 in.					106	112	115	118
5 ft 0 in.	107	117	122	126	107	114	117	120
5 ft 1 in.	109	119	124	128	109	116	119	122
5 ft 2 in.	112	122	126	130	112	119	121	124
5 ft 3 in.	115	125	129	133	115	122	124	127
5 ft 4 in.	118	128	133	136	118	125	128	131
5 ft 5 in.	122	132	137	140	122	128	131	134
5 ft 6 in.	126	136	141	144	126	132	135	138
5 ft 7 in.	130	140	145	148	130	136	139	142
5 ft 8 in.	134	144	149	152	134	140	143	146
5 ft 9 in.	138	148	153	156	138	143	147	150
5 ft 10 in.	142	152	157	161	142	147	151	154
5 ft 11 in.	147	156	162	166	147	151	154	157
6 ft 0 in.	152	161	167	172	152	156	158	161
6 ft 1 in.	157	166	173	178				
6 ft 2 in.	162	171	179	184				
6 ft 3 in.	167	176	184	190				
6 ft 4 in.	172	181	189	196				
6 ft 5 in.	177	186	194	201				

This table is based upon the weight taken at a life-insurance examination, with indoor clothing. The height is taken with shoes on. If the weight is taken without shoes or clothing, the proper deductions should be made for the height of the heels of the shoes and for the weight of the clothing.

Courtesy of the Life Extension Institute, Inc., New York City.

Beware of some methods by which you may reduce your weight. Radio, newspapers, and magazines advertise many simple methods. In principal, drugs definitely are harmful. Wrong dieting may also be harmful. The addition or subtraction of one food is usually inadvisable. Do not omit nutritious foods such as fruits, vegetables, milk, meat, and eggs. In omitting any food from the diet, always question what essentials it furnishes besides calories. When adjusting your diet reduce the carbohydrates (sweets, starches) and fats. White sugar, white flour, and lard contribute little except calories. Hence leaving pie crust of lard and white flour out of the diet eliminates many calories. But leaving out butter and cream, although also mainly fat, may result in a deficiency of vitamin A that may

Table 19. The Same Menu for

FOR THE OVERWEIGHT	FOR THE AVERAGE WEIGHT	FOR THE UNDERWEIGHT
Breakfast		
Fresh fruit (no sugar)†	Fresh fruit	Fresh fruit
1 egg	1 egg	1 egg
½ slice whole-wheat toast	2 slices whole-wheat toast	2 slices whole-wheat toast
½ pat butter	1 pat butter	2 pats butter
Coffee, top milk	Coffee, milk, or cocoa, as desired	Milk, cocoa, or postum made with milk, or coffee with hot milk
Luncheon or Supper		
Cream soup	Cream soup, 2 crackers	Cream soup, 3 crackers
Fruit or vegetable salad without dressing, or with lemon juice, or vinegar	Fruit or vegetable salad, with a tablespoon mayonnaise or French dressing	Fruit or vegetable salad, with 1½ to 2 tablespoons dressing
½ slice bread	1 slice bread	2 slices bread
½ pat butter	1 pat butter	2 pats butter
Skim milk or buttermilk	Whole milk	Milk and cream
	Cake or cookies	Cake or cookies
Dinner		
Meat (discard fat edge)	Meat	Meat
1 small baked potato	1 medium-sized baked potato	1 medium-sized baked potato
2 vegetables or one vegetable and salad	2 vegetables or one vegetable and salad	2 vegetables or one vegetable and salad (use extra salad dressing and butter)
	1 slice bread	1 slice bread
1 pat butter	2 pats butter	3 pats butter (use some on vegetables)
Milk	Milk	Milk
Fruit cup	Fruit cup, cookies	Fruit cup, cream, cookies

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* Courtesy of Hazel Hauck, College of Home Economics, Cornell University.

† Saccharin, in small amounts, appears to produce no ill effects, but it is probably best to learn to enjoy the natural flavor of unsweetened foods.

cause night blindness. One may easily add 10 to 15 pounds of weight in a year without realizing what is happening by a slight increase in calorie-rich foods—a candy bar a day or an extra serving of dessert. It is just as possible to reduce weight by the reverse method.

Individuals of Various Weights *

FOR THE OVERWEIGHT	FOR THE AVERAGE WEIGHT	FOR THE UNDERWEIGHT
Breakfast		
Fresh fruit (no sugar)	Fresh fruit	Fresh fruit
Whole-grain cereal, milk (small serving of puffed or flaked grains) or	Cooked cereal, whole-grain, top milk	Cooked cereal (whole-grain), cream
1 slice French toast (little or no trimmings)	1 slice French toast	French toast, 1 or 2 slices
	1 pat butter, syrup	2 pats butter, syrup
	Bacon	
Coffee, top milk	Coffee, milk, or cocoa, as desired	Milk, cocoa, or postum made with milk
Luncheon or Supper		
Omelet	Omelet	Omelet
Cooked greens	Cooked greens	Cooked greens
	1 slice bread	2 slices bread
	1 pat butter	2 pats butter
Fruit salad (no dressing)‡	Fruit salad	Fruit salad
	Cream dressing	Cream dressing (be generous!)
Milk or buttermilk	Milk	Milk
Dinner		
Fish (no rich sauce)	Fish (with tartar or other sauce)	Fish (with tartar or other sauce)
Mashed potatoes, small serving	Mashed potatoes	Mashed potatoes (generous servings)
Vegetable	Vegetable	Vegetable
Salad greens, with lemon juice or vinegar	Salad greens, French dressing	Salad greens (generous serving French dressing)
Milk or buttermilk	Milk	Milk with added cream
	1 slice bread	1 slice bread
	1 pat butter	2 pats butter (put one on vegetables)
Fresh fruit	Pudding	Pudding

Increasing the amount of exercise without increasing food consumption will help remove excess flesh and keep the tissues firm while you reduce. Exercise, if taken out of doors helps to supply vitamin D from sunlight or skyshine and is therefore more healthful and less expensive than some other forms of exercise. It is not advisable to lose more than 1 to 1½ pounds per week.

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‡ As a rule, salad dressings made with mineral oil should not be used since mineral oil taken with food interferes with the absorption of provitamin A.

The homemaker may find both under- and overweight members in her household. It is neither practical nor necessary to prepare different meals for them. In Table 19 are some menus suggesting how the same foods may serve fat, medium, and thin persons.

The proper weight for each person is the weight at which he feels best and maintains the best state of health. If improper weight persists after dietary treatment, consult a physician. The difficulty may be due to glandular disturbances, infection, or illness. Except in such cases, maintaining proper weight is simply a matter of adjusting food intake to activity.

We are all impressed by the looks of a well-proportioned person, one who is neither "too skinny" nor "too fat" for his height, and one who is neither too tall nor too short for his age. But a person may be the right height and weight for his age and yet not be well nourished. He may be anemic, have digestive disturbances or other nutritional difficulties. Weight is one useful tool indicating health, but by itself it is not a complete indication either in adults or children of one's state of health.

Symptoms of Good Nutrition Other Than Weight and Height

The person who has trained himself can judge much about his own as well as another's state of health not only by observing weight and height but also by noting other symptoms which are easily observable. A physician with a clinical background of experience and having access to highly complicated machinery may be necessary to diagnose the cause of ill health. But even though the cause may be due to faulty internal functioning, it will usually be evidenced in ways which can be seen by any observant person.

Weight and height can be judged fairly well by observation, or they can be measured accurately. Most of these other symptoms can be judged only by observation. They include the condition of the hair, skin, eyes, bony structure, posture, body processes, the firmness of the muscles and other less tangible evidences of good or poor health.

The Hair

Like all parts of the body, hair requires nourishment from food. One who is in a good state of health has smooth, glossy hair which looks alive. Little is known as to which foods have the most beneficial effects on the hair. In some deficiency diseases as scurvy, caused by lack of vitamin C, the hair is rough and dull.

Perhaps you have seen cats, dogs, or other farm animals with rough, gnarly, dry feeling, lusterless hair. When their nutrition was improved the hair took on a more glossy sheen. The same may be true of humans. Since the hair is usually exposed and easily accumulates dirt, dust, and grease, care other than good nourishment is necessary for its well-groomed appearance. Brushing, massaging, and washing all help in keeping the hair looking healthy. External care alone cannot produce healthy-looking, glossy hair—good health is the first prerequisite.

The Skin

The skin of a healthy person is smooth, clear, and slightly moist. Color of the skin may be misleading as a sign of health since the amount of pigmentation in skin varies considerably among healthy individuals. However, there is a rosy tinge and not a pale, pasty, gray appearance to the skin of a healthy person. The membrane of the eyes and mouth should be pink. If membranes are pale and colorless, it is one sign of anemia, or of lack of iron, in the diet.

Rough skin and rashes, particularly in infants, may be due to a deficiency or an excess of some food. There is no one food that causes such difficulties, but the individual's diet must be checked to see where it is out of balance. One breast-fed baby's face was a mass of blotches. As treatment, the baby was given only the first of the breast milk, thus reducing the fat content of the diet, and the skin cleared up. Another baby, bottle fed, was getting an excessive amount of sugar. Its skin was red, blotchy, and sensitive. The skin became clear when the sugar was reduced to the proper proportion.

The Eyes

In ill health the eyes are usually dull, listless, with dark circles under them. One of the first signs of recovery is brightening of the eyes. In health the eyes are bright and alert.

In addition to its effect on the appearance of the eyes, food has a direct effect upon the eyesight. There is a substance in the eye called visual purple which contains vitamin A. This substance is necessary in order to see in dim light or to adapt to change in intensity of the light. As we use our eyes, the supply of vitamin A is decreased and therefore must be replaced or night blindness results. Many people experience a feeling of insecurity in going from a bright light into a dark room, as from a lighted street into a dark theater. The ability of the eye to adapt quickly to this situation is dependent upon the amount of vitamin A in the eye.

Some also may have had the experience of having the image of a light remain on the retina after a bright light which they were facing has been extinguished. Try as they will, they cannot rid the eye of this image for some minutes. If you have difficulty in adapting quickly to change in intensity of light or if the image remains after a light is extinguished, check on the amount of vitamin A in the diet. (For sources of vitamin A see page 51.)

Bony Structure and Teeth

The bones of the legs and arms should be straight with no enlargements at the joints. The chest should be broad to allow for expansion in breathing, the head well shaped, the back straight with shoulder blades not too prominent, and the jaw well formed and broad enough for the teeth to be well placed. Teeth should be free from cavities.

The mother's diet during pregnancy affects her child's teeth and bones. The teeth begin to form before birth. Their growth and development after birth depend to a considerable extent upon the child's diet especially during infancy. Calcium, phosphorus, and vitamins A, D, and C are all essential for the best development of bones and teeth and therefore should be considered in the diet of mother and child.

Occasionally mothers say, "I do not believe diet has a thing to do with good teeth. My child always drank plenty of milk and still his teeth are poor." Scientists do not claim to know the whole story of tooth decay. At least we know that calcium alone cannot build strong teeth. Many intelligent people who have learned the value of milk may be overbalancing the diet with it. Numerous children have been brought to our attention with poor teeth even though they have had more than a quart of milk a day throughout childhood.

Though a child receives what seems to be ample amounts of calcium, phosphorus, and vitamins A, D, and C, we still cannot be certain that the body is utilizing this amount. Some authorities feel that minute amounts of fluorine are beneficial to the teeth. Whether inheritance has an influence is a debatable question. At present the best we can suggest is to keep your child on a well-balanced diet containing considerable variety.

Muscles

The muscles should be firm. Poor musculature indicates improper food or insufficient exercise. Soft, flabby muscles may lack ability to support the bones. Round shoulders, hollow chest, and protruding abdomen may result. Protein foods such as milk, meat, cheese, and eggs are essential for building firm muscles.

If nutrition is good, parents should not have to tell a child to stand or sit up straight. It behooves us as parents and teachers to nourish rather than nag.

Other Symptoms

There are other symptoms of good nutrition such as facial expression, posture, normal functioning of body processes, appetite, sleep, and the ability to be at ease in one's surroundings. These symptoms, though somewhat less tangible than those previously mentioned, are obvious to the alert observer.

One shows joy, sorrow, fear, and pain in facial expression so that we may expect good nutrition to show in an alert, generally pleasant expression.

Correct posture while sitting is just as important as when standing. In good posture the body should be erect, chest out, and abdomen in. Walk with the feet parallel or toeing in slightly. Faulty posture may be due to habit or to poor nutrition. In other words, winged shoulders, sunken chest, and enlarged abdomen all give the appearance of poor posture but may be due to poor nutrition. It is important, therefore, to make certain that a child's diet is adequate before you ask him to stand or sit straight.

Digestion, circulation, respiration, metabolism, elimination, and reproduction are all normal body processes in normal human beings as well as in other animals. If nutrition and hygienic regimen are adequate, these body processes should go on without our being aware of them. Some of the external symptoms when these processes do not function properly may be coated tongue, bad breath, skin eruptions, constipation, listlessness, lethargy.

Good digestion waits on appetite, and health on both. This is a very old but true saying. Hence appetite, the normal desire for food, is a symptom of good digestion, resulting in good nutrition.

Sleep is another measure of nutrition. A well-nourished person does not generally have to be rocked to sleep, sung to sleep, or even have to count the sheep going over the fence. He is not concerned whether he sleeps on his back, his right side, his left side, or his "tummy." As one older, well-nourished man says, "I sleep on whichever side hits the bed first." He sleeps more or less quietly and awakens in the morning feeling refreshed and ready for the day's work or play.

In Chapter I we referred to the rats on a poor diet who bit at the attendants and even ate each other. Ill-nourished human beings are frequently irritable, restless, and ill at ease. They are unable to enjoy the company of other adults or to adjust to the joyous living of children. They are not happy to stay home or can they find contentment in new environments.

The final measure of the whole man, according to Donaldson, in 1903, is "neither the number of pounds that he can lift, nor the fact that he can discover, nor the influence he can exert upon his fellows, nor yet the age to which he can attain, but something of each of these and what they stand for taken together."

The Newly-Weds' Food Problem

The bride of today is confronted with a much different problem in the feeding of her family than the bride of fifty years ago. Many factors are responsible for this difference, including our newer knowledge of nutrition; our homes which frequently are a small, compact apartment with little storage space; our factories which provide us with highly refined foods from which vital factors may have been removed; new methods of storage and preservation; and better means of transportation which have made available a wide variety of foods for all twelve months of the year. Formerly many foods were available for only a short period each year and were restricted to the locality in which they were grown. Many homemakers in the past went to the field and helped with the planting and harvesting. Today, too often, the housewife either orders her food by telephone or goes to market in an automobile.

Housing in the past tended to be more spacious than now. This allowed for greater food storage at home and for more canning, drying, curing, and smoking of foods. These factors all make the feeding of the family a different story from what it was fifty years ago.

The bride of fifty years ago received most of her knowledge of foods from her mother and other relatives. Her recipes were handed down from mother to daughter. She was not aware of the importance of such substances as vitamins and minerals. These elements were just as essential for health then as they are today but perhaps then there was less need for concern because the diets contained more natural foods. For instance, to replenish the family's supply of cereal and flour, the farmer took a bag of wheat to the mill. The whole grain was ground and he took home all he brought, not leaving a large portion of the vitamins and minerals at the mill. Our present-day, highly refined and processed foods often lose most of their vitamins and minerals in the manufacturing process.

Improved methods of transportation aid in many ways but not without some disadvantages. The quality of food changes with the time necessary to transport it long distances. There is a difference in the nutritive value of freshly picked fruits and vegetables and those which have been held after harvest. Vitamin C is greatly affected with the aging of the product and its exposure to air.

Some of the expensive processes of handling food brought about by our new era have unintentionally created new nutrition and food problems. Not all this change has been progress.

One principal problem, therefore, is food selection. Today's housewife buys more of her year's food supply, whereas her grandmother was restricted largely to using the store of home-produced foods, whatever they were. A wide choice of foods is now available. The housewife of today can with proper selection greatly improve the diet as compared with that of her grandparents, or she can make it much worse by poor selection. The nutritive value of certain products now on the market has been painted in glowing pictures by faddists. The homemaker should be aware of this, and use common sense to distinguish between the fads and the facts which are backed by research. Research is giving new facts which should be used to improve the health and well-being of the family. A vast supply of nutritional knowledge is now available.

Fig. 21.

The Newly-Weds Practice Nutrition

Analysis of the Diet

In analyzing a diet one should always consider for whom the diet is planned. What is the condition of the individual or group of individuals for whom the diet is planned? Where are they physically? What kind of work do they do? How much do they have to spend? What changes would you like in their physical condition, and how can you with the food and money available, help to make these changes? Table 20 is a diet planned by Mrs. B. for herself and family. This diet was one record selected from a survey taken under supervision of the College. This is a nutritionally inadequate diet, but many worse ones were found in that study. If we were feeding guinea pigs on this diet they would probably in a short time show poor bone and tooth development and low hemoglobin. Their eyes would probably be sore and the animals might show symptoms of scurvy and be nervous and irritable. Human beings do not show these symptoms as rapidly and we have not been taught to look for them. However, there is no doubt that if this diet were continued over a period of time such symptoms would appear.

This dietary is adequate in calories and protein. It is extremely deficient in vitamins A, B_1, and C. It is somewhat deficient in calcium, phosphorus, and iron. A person on this diet would probably maintain weight but would be drawing upon her reserve of calcium, phosphorus, iron, and vitamin A. Vitamins C and B_1 and riboflavin are low, and according to present knowledge it is uncertain whether they are stored in the body; hence they should be included in adequate amounts in the diet. If a diet similar to this is continued, we would expect mild symptoms of the deficiencies such as dim vision, lesions at corners of mouth, paleness, and a "tired feeling."

The most outstanding errors in this dietary are lack of fruit, green vegetables, and egg. The vegetables, consisting of two servings of potatoes and one of corn, are starchy. Meat was served twice and eggs not at all. Milk is also low. For these reasons, the vitamins and the minerals are low.

Table 21 shows the diet revised to make it adequate. A baked apple sweetened with molasses, cream of tomato soup, and a mixed green salad were added. One serving of potatoes was changed to a green vegetable. An egg was served at noon in the place of the meat, and whole-wheat bread replaced the white bread. The revised diet had less bread and sugar. When on a well-balanced diet there is less tendency to eat large amounts of sweets and starchy foods. The totals show an increase in calories but decided increases in the vitamins and minerals. Although food requirements are usually spoken of as the daily requirement, we can safely call the diet adequate if the requirements are filled satisfactorily for the week as a whole.

You and your family might benefit if occasionally you took time to check a day's diet in this way. Other members of the family might enjoy doing this with you. For the nutritive value of foods, see Appendix.

Table 20. A Day's Diet That Is Inadequate

Food	Amount	Calories	Protein	Minerals		Vitamins			
				Calcium	Iron	A	Thiamin	C	Riboflavin
			grams	*percentage daily allowance*		*I.U.*	*micrograms*	*milligrams*	*micrograms*
Breakfast									
White toast	2 slices	150	6	4	4	.....	34	0	.....
Butter	1 tbsp	100	0	0	0	312	.....	..	.....
Coffee	1 cup	...	..	..	..	.....	.....	..	.....
Cream 40%	2 tbsp	120	1	4	0	374	19	..	.....
Sugar	2 tsp	33	0	0	0	.....	0	..	0
Lunch									
Hamburg	2 oz	89	12	1	14	29	68	..	128
Potato	1 medium	100	3	2	9	36	144	16	54
Bread, white	2 slices	150	6	4	4	.....	34	0	0
Butter	1½ tbsp	150	0	0	0	468	.....	0	0
Angel food, iced	4″ × 2½″ × 1¼″	300	3	0	0	.....	.....	..	105
Milk	1 cup	170	8	36	4	268	146	2	549
Mid P.M.									
Ice cream	½ cup	179	2	10	2	590	12	1	66
Supper									
Hamburg	3½ oz	156	21	2	25	50	120	..	225
Potato	1 medium	100	3	2	9	36	144	16	54
Corn	⅓ cup	98	3	1	4	.....	.....	5	.....
Bread, white	2 slices	150	6	4	4	.....	34	..	.....
Butter	1½ tbsp	150	0	0	0	468	.....	0	.....
Angel food, iced	4″ × 2½″ × 1¼″	300	3	0	0	.....	.....	..	105
Tea	1 cup	0	..	0	0	0	0	0	.....
Sugar	2 tsp	33	..	0	0	0	0	0	.....
Total		2,528	77	70	79	2,631	755	40	1,286
Daily allowance for woman 125 lb *		about 2,500	60	100	100	5,000 †	1,500	70	2,200

* Daily allowance according to National Research Council.

† According to research by Edmund and Clemmesen, 1400 I.U. of vitamin A was found sufficient to prevent night blindness. [44]

0 means none of the nutrient in the food.

Leaders mean amount unknown.

Table 21. A Day's Diet That Is Adequate

Food	Amount	Calories	Protein	Minerals		Vitamins			
				Calcium	Iron	A	Thiamin	C	Riboflavin
			grams	*percentage daily allowance*		*I.U.*	*micrograms*	*milligrams*	*micrograms*
Breakfast									
Apple, baked	1 medium	80	1	2	6	128	77	9	51
Molasses, cane	1 tbsp	67	1	7	14	0	.....	0	.....
Oatmeal	4 tbsp uncooked	100	4	2	10	.....	135	0	26
Milk	⅓ cup	57	3	12	1	89	49	1	183
Toast, whole-wheat	1 slice	75	3	3	4	.....	84	0	25
Butter	1 tbsp	100	0	0	0	312	.....	..	.....
Coffee	1 cup	....	..	..	..	.....	.....	..	.....
Cream 40%	2 tbsp	120	1	4	0	374	19	..	.....
Sugar	1 tsp	33	0	0	0	0	0	0	0
Lunch									
Egg	1 medium	80	7	4	13	500	75	0	165
Peas	¾ cup	100	7	3	18	1,000	420	25	195
Bread, whole-wheat	1 slice	75	3	3	4	.....	84	0	25
Butter	1 tbsp	100	0	0	0	312	.....	..	.....
Angel food	2″ × 2½″ × 1¼″	100	3	0	0	.....	.....	..	105
Milk	1 cup	170	8	36	4	268	146	2	549
Supper									
Cream of tomato soup	1 cup	269	8	29	9	.....	30	..	225
Hamburg	3.5 oz	156	21	2	25	50	120	..	225
Potato, baked	1 medium	100	3	2	9	36	144	16	54
Corn	⅓ cup	98	3	1	4	.....	.....	5	.....
Salad, mixed greens	½ cup	50	1	2	5	1,300	88	15	72
Bread, whole-wheat	1 slice	75	3	3	4	.....	84	0	25
Butter	2 tbsp	200	0	0	0	624	.....	..	.....
Angel food	2″ × 2½″ × 1¼″	100	3	0	0	.....	.....	..	105
Ice cream	½ cup	179	2	10	2	590	12	1	66
Tea	1 cup	....	..	..	..	.....	.....	..	.....
Sugar	1 tsp	33	..	..	..	.....	.....	..	.....
Total		2,517	85	125	132	5,583	1,567	74	2,096
Daily allowance for woman 125 lb *		about 2,500	60	100	100	5,000 †	1,500	70	2,200

* Daily allowance according to National Research Council.
† According to research by Edmund and Clemmesen, 1400 I.U. of vitamin A was found sufficient to prevent night blindness. [44]
0 means none of the nutrient in the food.
Leaders mean amount unknown.

To check every food value for each meal in this manner would be too monotonous and time consuming. The pleasure of preparing and eating the food would be greatly reduced. What, then, is a simple way to insure an adequate diet for the family without all this study of each meal? Some practical guides will be given in the following section.

Building an Adequate Diet for Adults

The health of the family is to a considerable extent dependent upon the food consumed. Hence the one who plans the meals should accept it as a task worthy of some time and thought. Do not get in the habit of walking into the kitchen fifteen minutes before meal time and then wonder which cans you will open today. When correct food habits are established, it minimizes the work. If the bride will plan her meals wisely from the beginning, she should soon find meal planning an interesting challenge.

Try to include the following in the daily diet for each adult.

1 cup to 1 pint of milk, or 1½ to 2½ ounces of hard, pressed cheese such as Cheddar, Swiss, or processed.
1 serving of potatoes.
1 green or yellow vegetable.
1 additional vegetable if possible, including peas, beans, or lentils.
1 serving of tomatoes or citrus fruit.
1 other fruit, including dried fruit once a week.
1 egg which may be used in cooking (4 to 7 per week).
Meat, fish, or poultry (including sea fish and a glandular organ such as liver once each week) or meat substitutes as beans, peas, or lentils.
Bread and butter; use mostly whole-grain bread and cereal.

Do not be alarmed if your diet does not conform to this each day. It is given as a guide to help in planning meals.

It is desirable for one of these fruits or vegetables to be eaten raw. These rules are not compulsory. It is possible to have an adequate diet without following the rules precisely. Several vegetables might be served and potatoes omitted, or iron-rich vegetables stressed and egg omitted.

The suggestions given help meet the daily requirements in the following ways. The milk and cheese contribute calcium, phosphorus, and complete protein. Milk is an excellent source of riboflavin. When cheese is substituted for milk, consult chart, page 62, for good sources of riboflavin. The fruits and vegetables give water-soluble vitamins, dried fruits supply appreciable amounts of iron, and green vegetables are good sources of vitamin A and iron. Eggs contribute complete protein, riboflavin, vitamins

A, D, and iron. Meat adds complete protein, phosphorus, iron, and vitamin B_1 (thiamin). Liver is suggested once a week because it supplies all known vitamins and is an especially good source of iron, vitamin A, riboflavin, and complete protein. Fish give variety, are a good source of complete protein; sea fish give iodine and, if fat, fish may add materially to the supply of vitamins A and D.

Although these foods meet the daily adult requirements, other combinations of food will also. It is the nutrients which should be included rather than specific foods. If any one group of foods listed is not available study its nutritive value and see what food or foods can be substituted.

Remember to use sparingly foods which include little but calories. (See Table 1.) Sugar consumption should be low. The consumption of sugar in the United States averages approximately 4½ ounces per capita daily. This is more than 500 calories or approximately one-fourth of all the calories of the adult diet. When sugar furnishes this portion of the diet, it is very difficult to meet the vitamin and mineral requirements.

Use variety in your menus and avoid refined foods as much as possible.

Time and planning can be economized by serving one very simple meal each day such as bread or crackers, with cheese, and fruit; salad or soup with sandwiches and fruit or simple dessert. This meal is a good place to use leftovers. This meal might be served cold in warm weather. We hear about the necessity of a hot food at each meal; food may be too hot or too cold. Foods to be utilized are changed to body temperature in the body. We have no experimental work to show that hot foods are beneficial or cold foods harmful. Experimental work with animals, however, from which much of our nutritional data is obtained, is done with food at room temperature. More attention should be paid to the nutritive value rather than to recipes or other concoctions of hot foods. The simpler your food preparation the better its nutritive value. While a great variety in one meal is not essential, the homemaker should include a wide variety in the week's menus to assure a more adequate supply of proteins, vitamins, and minerals.

On page 101 are menus for the newly-weds for one week. No one set of menus can be expected to fit exactly into a particular family's situation. These are intended only as illustrations. They show menus which supply the needed elements adequately if average servings are used.

In general, the dinner has been planned for the evening meal except on Sunday when the husband is at home.

These are moderately priced menus; for suggestions for reducing cost see pages 291–301.

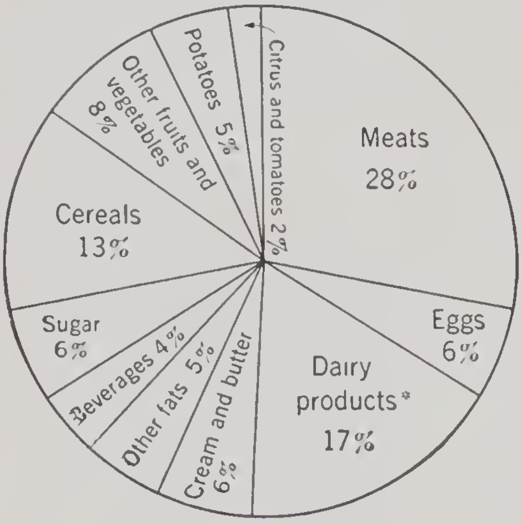
WEEK'S DIET FOR FAMILY OF TWO HEALTHY ADULTS, HOMEMAKER AND MAN OF AVERAGE ACTIVITY

(Late summer)

Breakfast	*Noon*	*Evening*
	Sunday	
Orange Raisin toast Omelet Coffee, top milk, sugar	Roast chicken Buttered rice (preferably brown) Buttered carrots Lettuce salad with Thousand Island dressing Hard rolls Apple pie Milk or tea	Vegetable bowl salad Raisin bread Cookies Hot chocolate
	Monday	
Oranges Whole-wheat toast Egg Coffee, top milk, sugar	Cream bean soup Crackers, Triscuits Apple pie	Creamed chicken Mashed potato Buttered spinach Tomatoes, sliced Fruit cup Milk
	Tuesday	
Melon Cereal, brown sugar, top milk Whole-wheat toast, butter, jam Coffee, top milk, sugar	Cheese soufflé Whole-wheat bread Beet greens Chocolate cake Tea	Stuffed pork chops Buttered beets Fruit salad Bread Chocolate cake Milk
	Wednesday	
Stewed apricots Bacon and eggs Whole-wheat toast Coffee, top milk, sugar	Tomato salad Bread and butter Milk Chocolate cake	Meat loaf Baked potatoes Buttered peas Bread Vegetable salad French dressing Ice cream with caramel sauce Coffee or milk
	Thursday	
Pineapple, fresh or juice Whole-wheat toast Marmalade Egg, soft-cooked Coffee, top milk, sugar	Meat loaf sandwiches Lettuce and tomato salad Ice cream Milk	Breaded veal Scalloped potatoes Buttered green beans Brown bread Celery Fresh peaches Milk
	Friday	
Orange Waffles Sausage Coffee, top milk, sugar	Creamed potatoes Celery and spinach salad Toasted brown bread Peaches, cream Milk	Salmon loaf Parsley potatoes Buttered carrots Bread Fresh pineapple Tea or milk
	Saturday	
Blueberries Scrambled eggs Raisin toast Coffee, top milk, sugar	Cheese and lettuce sandwiches Whole-wheat bread Fruit Cookies Milk	Broiled liver Onions Creamed potatoes Carrot strips Blueberry muffins Fresh applesauce Milk

Market Order

The first factor to consider before buying food is the amount of money to be spent. It is easier to feed the family adequately if the income is high, but one can spend much money for food and be poorly nourished or spend relatively little and be adequately nourished.



*Except butter and cream

FIG. 22. Expenditure for foods—average workingman's family, 1935-1939.

The cost of your order will vary according to locality, season, and year.

The amount spent for cereals and breads varies most with differences in income. Those on a high income spend less for cereals and those on a low income spend more.

Figure 22 shows the approximate proportions of major food expenditures, 1935 to 1939. It can easily be compared with the suggested one-fifth expenditure. [10] We are not recommending that one follow the one-fifth division, for food expenditures vary with family habits and also with the amount of money available for food.

Government publications often group foods into twelve classes. [45]

1. Milk and milk products.
2. Potatoes and sweet potatoes.
3. Dry, mature beans, peas, and nuts.
4. Tomatoes and citrus fruits.
5. Leafy green and yellow vegetables.
6. Other vegetables and fruits.
7. Eggs.
8. Lean meat, poultry, and fish.
9. Flours and cereals.
10. Butter.
11. Other fats.
12. Sugars.

It might be helpful to think of this grouping as a check list to see that each group is represented in your weekly diet.

We are eating approximately the same total pounds of food per capita today as we consumed thirty-six years ago (Table 22). Even though the pounds of food consumed remained fairly constant, the kinds of foods consumed have changed. The consumption of cereal has decreased decidedly; meat, eggs, and potatoes have decreased, but to a lesser degree.

Table 22. Changes in Quantity of Food Consumed (All Ages), United States

	Quantity per Capita (Pounds)				Change			
	1909–13 Average		1935–39 Average		Pounds		Percentage	
Cereals								
Wheat	299.2		222.4		−76.8		−26	
Corn	125.2		67.6		−57.6		−46	
Other	74.9		47.6		−27.3		−36	
Total		499.3		337.6		−161.7		−32
Dry beans		7.2		9.7		+2.5		+35
Meats								
Beef and veal	75.1		62.9		−12.2		−16	
Pork	66.3		56.2		−10.1		−15	
Lamb and mutton	7.1		6.8		−0.3		−4	
Chickens (dressed wt.)	20.1		18.6		−1.5		−7	
Turkeys (dressed wt.)	(no inf.)		2.6		+2.6		–	
Total		168.6		147.1		−21.5		−13
Eggs		38.5		36.9		−1.6		−4
Dairy products * (other than butter)								
Fluid milk and cream	319.6		346.2		+26.6		+8	
Mfg., other than butter	61.6		117.6		+56.0		+91	
Total		381.2		463.8		+82.6		+22
Fats and oils								
Butter	17.6		17.0		−0.6		−3	
Lard	11.7		11.1		−0.6		−5	
Other	12.6		19.9		+7.3		+58	
Total		41.9		48.0		+6.1		+15
Fruits								
Apples, fresh	66.7		41.8		−24.9		−37	
Citrus, fresh	18.7		50.3		+31.6		+169	
Other, fresh	61.9		61.2		−0.7		−1	
Total, fresh		(147.3)		(153.3)		(+6.0)		+4
Fruits								
Canned	3.6		13.8		+10.2		+283	
Dried	4.0		6.0		+2.0		+50	
Juices	0.3		4.3		+4.0		+1,333	
Total (fresh equiv.)		(12.2)		(47.2)		(+35.0)		+287
All fruits (fresh equiv.)		159.5		200.5		+41.0		+26
Vegetables								
Potatoes (fresh)	189.4		145.4		−44.0		−23	
Sweet potatoes (fresh)	33.7		31.8		−1.9		−6	
Other (fresh)	229.0		254.8		+25.8		+11	
Tomatoes, canned (excl. juice)	5.9		5.8		−0.1		−2	
Corn, canned	3.2		4.1		+0.9		+28	
Peas, canned	1.8		4.7		+2.9		+161	
Other (incl. tomato juice)	3.4		10.5		+7.1		+209	
Total (fresh basis)		486.6		472.3		−14.3		−3
Sugar		82.2		103.6		+21.4		+26
Beverages								
Coffee	9.4		14.0		+4.6		+49	
Tea	1.0		0.7		−0.3		−30	
Cocoa	1.4		4.4		+3.0		+214	
Total		11.8		19.1		+7.3		+62
Total, all foods		1,876.8		1,838.6		−38.2		−2

* Milk-equivalent basis.

Courtesy F. A. Harper, Agr. Econ. Dept., Cornell University.

Dairy products, fats, most fruits and vegetables, as well as coffee and cocoa have increased in consumption. Sugar has increased although not at as rapid a rate as some time back. It is fine for the consumption of nutritious foods like dairy products, fruits and vegetables, to increase, but it is a blot on our nutritional record for the consumption of sugar, which gives us nothing but calories, to continue to increase.

For hints to help in selecting an economical and adequate diet, see page 299.

Every family must be considered individually. It is each homemaker's duty to spend her money wisely. Collect your data and then make your knowledge function. Remember the story of the old farmer who was sitting by the roadside when an agent came along. The agent tried to sell the farmer a journal on better farming methods. Finally the farmer said, "Git along, feller, I ain't doin' as well as I know how now." It is easy for many people to learn nutritional facts but difficult to put them to practice; hence the following quotation: "If to do, were as easy as to know what to do, then chapels would be churches, and poor men's cottages princes' palaces."

REFERENCES

1. R. McCarrison, *Nutrition and Health,* Gabrielle Howard Memorial Lecture, Headley Brothers, London (1937).
2. L. A. Maynard, *Animal Nutrition,* Chapter 7 (page 97), McGraw-Hill, New York (1937).
3. M. S. Chaney and M. Ahlborn, *Nutrition,* Rev. Ed., Houghton Mifflin, Boston (1939).
4. D. B. Jones, Protein requirements of man, *Food and Life,* page 186, U. S. Dept. Agr., U. S. Govt. Printing Office (1939).
5. H. S. Carter, P. E. Howe, and H. H. Mason, *Nutrition and Clinical Dietetics,* 2d Ed. (page 497), Lea and Febiger, New York (1921).
6. H. M. Hauck, *How To Control Your Weight,* Cornell Bulletin for Homemakers 329, New York State College of Agriculture, Ithaca, New York (1942).
7. W. A. Price, *Nutrition and Physical Degeneration,* P. B. Hoeber, New York (1940).
8. Results of Investigation Conducted by New York University, Butchers Advocate, February, 1941.
9. M. H. Friedman and W. A. Turner, Nutrition and reproduction, *Food and Life,* page 488, U. S. Dept. Agr., U. S. Govt. Printing Office (1939).
10. H. C. Sherman, *Chemistry of Food and Nutrition,* 6th Ed., Macmillan, New York (1941).
11. L. C. Frank, F. A. Clark, W. H. Haskell, M. M. Miller, F. J. Moss, and R. C. Thomas, Do children who drink raw milk thrive better than children who drink heated milk? *Public Health Reports* 47, 1951–1960 (1932).
12. J. C. Williams, Calcium in meat cooked with acid, *Food Research,* Vol 1, page 537 (1936).

13. P. E. Prentiss, *Hunger and History*, Harper and Brothers, New York (1939).

14. M. A. Dickson, Iron and copper requirements, *Food and Life*, page 198, U. S. Dept. Agr., U. S. Govt. Printing Office (1939).

15. G. Hambidge, A summary, *Food and Life*, page 6, U. S. Dept. Agr., U. S. Govt. Printing Office (1939).

16. G. E. Smith, Fetal athyrosis, a study of the iodine requirement of the pregnant sow, *Jr. Biol. Chem.*, Vol. 29, pages 215–225 (1917).

17. E. B. Hart and H. Steenbock, Thyroid hyperplasia and the relation of iodine to the hairless pig malady, *Jr. Biol. Chem.*, Vol. 33, pages 313–323 (1918).

18. J. I. Roundtree, *The Problem of Food*, Public Affairs Pamphlet 33, Rev., Public Affairs Committee, New York (1940).

19. O. P. Kimball, Prevention of goiter in Michigan and Ohio, *Jr. Am. Med. Assoc.*, Vol. 108, pages 860–864 (1937).

20. H. T. Dean, P. Jay, F. A. Arnold, Jr., and E. Elvove, *Domestic Water and Dental Caries*, Public Health Reports, Vol. 56, pages 365–381 (1941).

21. M. C. Smith and H. V. Smith, Observation on the durability of mottled teeth, *Am. Jr. Pub. Health*, Vol. 30, page 1050 (1940).

22. K. E. Mason, Foetal death, prolonged gestation, and difficult parturition in the rat as a result of vitamin A deficiency, *Am. Jr. Anat.*, Vol. 57, pages 303–349 (1935).

23. J. Ruhräh, Pediatrics in art, *Am. Jr. Diseases Children*, Vol. 43, page 977 (1932).

24. E. A. Park, The use of vitamin D preparations in the prevention and treatment of disease, *The Vitamins*, pages 532–533, Am. Med. Assoc., Chicago (1939).

25. H. R. Butt and A. M. Snell, *Vitamin K*, W. B. Sanders, Philadelphia (1941).

26. S. Ansbacher, E. Fernholz, and M. A. Dolliver, Water Soluble Antihemorrhagic Compounds, *Proc. Soc. Exptl. Biol. Med.*, Vol. 43, pages 652–655 (April, 1940).

27. H. R. Butt, A. M. Snell, and A. E. Osterberg, The use of vitamin K and bile in the treatment of the hemorrhagic diathesis in cases of jaundice, *Proc. Staff Meetings, Mayo Clinic*, Vol. 13, pages 74–80 (February 2, 1938).

28. J. D. Greaves and C. L. A. Schmidt, Nature of the factor concerned in loss of blood coagulability of bile fistula rats, *Proc. Soc. Exptl. Biol. Med.*, Vol. 37, pages 43–45 (October, 1937).

29. G. Selfridge, Eighth Nerve High Tone Deafness from a Nutritional Standpoint, *Ann. Otol. Rhin. Larynx*, Vol. 48, pages 608–631 (1939).

30. O. L. Kline, Vitamin B, *Food and Life*, page 232, U. S. Dept. Agr., U. S. Govt. Printing Office (1939).

31. C. A. Elvehjem, The Vitamin B complex in practical nutrition, *Jr. Am. Diet. Assoc.*, Vol. 15, pages 6–12 (1939).

32. H. E. Munsell, Planning the day's diet for vitamin content, *Jr. Am. Diet. Assoc.*, Vol. 15, pages 639–647 (1939).

33. F. Fenton and L. Brewer, *The Art of Vegetable Cookery*, Cornell Bulletin for Homemakers 178 (1937).

34. F. Fenton, D. K. Tressler, and C. G. King, Losses of Vitamin C during the cooking of peas, *Jr. Nutr.*, Vol. 12, pages 285–295 (1936).

35. F. Fenton, D. K. Tressler, S. C. Camp, and C. G. King, Losses of vitamin C during the cooking of Swiss chard, *Jr. Nutr.*, Vol. 14, pages 631–640 (1937).

36. O. A. Bessey, Vitamin C assay, *The Vitamins,* pages 365–371, Am. Med. Assoc., Chicago (1939).

37. M. B. Strauss, The primary role of the plasma proteins in conditioning water retention and edema formation in normal and "toxemic" pregnancy, *Am. Jr. Med. Sci.,* Vol. 195, pages 723–728 (1938).

38. C. A. Elvehjem, D. Duckles, and D. R. Mendenhall, Iron versus iron and copper in the treatment of anemia in infants, *Am. Jr. Diseases Children,* Vol. 53, page 785 (1937).

39. C. A. Elvehjem, E. B. Hart, and W. C. Sherman, The limitations of cereal milk diets for hemoglobin formation, *Jr. Pediat.,* Vol. 4, page 65 (1934).

40. C. M. McCay, *Interplay of Dietary Constituents* (unpublished lecture given at Nutrition Conference at Cornell Univ., July, 1940).

41. A. N. Donaldson, Relation of constipation to intestinal intoxication, *Jr. Am. Med. Assoc.,* Vol. 78, pages 884–888 (1922).

42. W. C. Alvarez, *Minnesota Med.,* Vol. 14, page 296 (April, 1931).

43. E. A. Park, The etiology of rickets, *Physiol. Rev.,* Vol. 3, pages 106–163 (1923).

44. C. Edmund and S. Clemmesen, Relation between visual adaptation and vitamin A deficiency, *Nordick Hygienick Tidskrift,* Vol. 18, pages 227–307 (1937).

45. H. K. Stiebeling and F. Clark, Planning for good nutrition, *Food and Life,* page 323, U. S. Dept. Agr., Govt. Printing Office (1939).

CHAPTER III

THE BABY IS COMING

Contents

- *A.* Reproduction
- *B.* Signs of Pregnancy
- *C.* Consulting a Physician
- *D.* Nourishing the Fetus
- *E.* Factors Other Than Diet To Consider during Pregnancy
- *F.* Disturbances Common in Pregnancy
- *G.* Signs of Labor

FIG. 1. The baby is coming.

MRS. LYNN reported to her friends, "I'm having a baby in the fall." They all enjoyed discussing with her the plans in anticipation of the coming of the new baby. What a different attitude from that taken not so many years ago! Then the coming of a baby was usually not discussed, and the mother-to-be lived more or less in seclusion. It was not considered proper for her to discuss the subject with her friends, as Mrs. Lynn did. A young mother, who recently had her first baby, laughingly told us about her grandmother who advised her mother when pregnant the first time to be sure not to tell her husband of the coming event. Supposedly, even the father-to-be was to conceal all apparent knowledge until the baby was born, and then register surprise.

Times have changed. Pregnancy is now accepted as a normal condition and the mother is allowed to lead a normal life. This enables and encourages her to take better care of herself. It is of great importance that she eat properly to provide for herself and the growing baby. Good prenatal nutrition helps to give the baby a good start, whereas poor nutrition will result in detriment to the mother and may result in the baby's being born with some deficiency which may be a serious handicap. The nutrition of the mother, therefore, during the nine months before the baby enters this world, is exceedingly important to his future as well as to hers.

Reproduction

Only recently has one dared to talk about reproduction. Suddenly it has arisen on the horizon as such an important subject that perhaps it has been overemphasized. Mothers feel that they must tell their children "the story of life." They may become so tense about it that they forget it is a normal part of life. The story is told of a woman who felt it her duty to tell her little girl where she came from. The mother waited and waited for an opportunity to tell her. One day Elizabeth, aged eight, ran in from school, quite excited, and asked, "Mother, where did I come from?" "Now," thought the mother, as she steeled herself for the ordeal, "the time for my story has come." She went to great length in telling the story of reproduction. When she had finished, Elizabeth looked up and said, "Mother, that is all very interesting, but Jane came from Philadelphia."

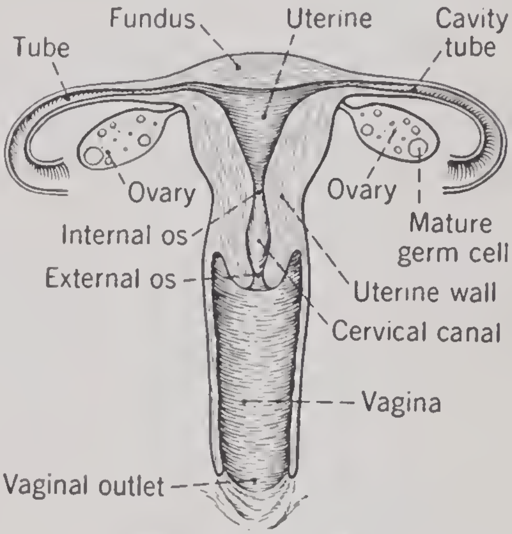
Reproduction means to produce again in the likeness of one's self. All life is made up of cells. The bodies of men and women contain cells which have the special function of reproduction. These cells in women are called "ova" and in men "spermatozoa." The ovum is the largest cell in the human body but is only $1/_{125}$ of an inch in diameter. Through a microscope it appears as a little round bag. It contains a nucleus which is surrounded by the yolk or nutritive material.

The spermatozoon or male germinal cell is longer and narrower than the ovum. It is arrow shaped with a tail to propel it since it must travel some distance to reach a mature ovum. A new human being results from the union or fusion of an ovum and a spermatozoon. The fertilized cell passes down the Fallopian tube, and in a few days it normally becomes attached to the velvety lining of the uterus, a muscular sac in which the baby develops.

Figure 2 shows the location of the female reproductive organs. In the pelvis, the bony basin between the hips, lie the reproductive organs, the uterus in the center with an ovary at each side. The uterus is triangular in shape. The interior is funnel shaped, the larger part at the top leading into the Fallopian tubes. The lower, narrow part leads into the cervix or neck of the uterus which extends to the vagina, a canal opening to the exterior of the body.

The uterus is prepared each month to receive a fertilized cell. The changes which take place are sometimes spoken of as a cycle. At one stage of the cycle mucous membrane is cast off. It is expelled from the vagina with some bleeding which is called menstruation.

This process of menstruation starts at about 14 or 15 years of age in the temperate zone. It is a sign of sexual maturity. The final cessation of menstruation is called menopause and usually occurs between 45 and 55 years of age. It marks the end of the child-bearing period.



Courtesy of The Macmillan Co.

FIG. 2. Reproductive organs of the female. From C. C. Van Blarcom's *Getting Ready To Be a Mother.*

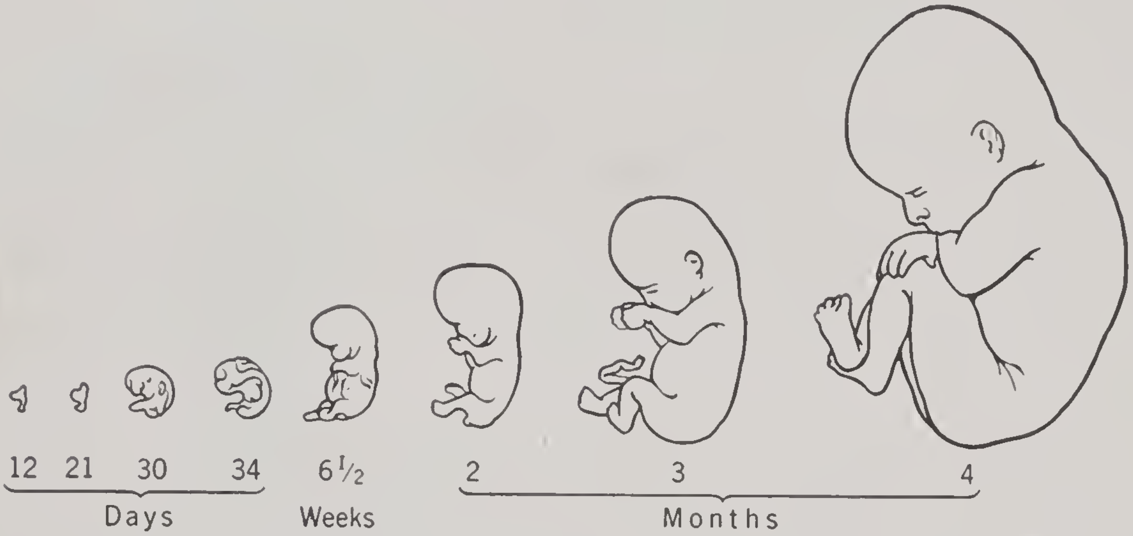
The muscular tubes extending from the upper openings of the uterus toward the ovaries are about 5 inches long and are called the Fallopian tubes or sometimes simply the tubes. They are lined with millions of short hairlike structures which sway to and fro, creating a current to carry the ovum to the uterus.

Normally, from puberty to menopause ova mature or ripen and leave the ovary. The lining of the uterus thickens and softens to simplify the attachment of the ovum should it be fertilized by the male cell.

The fertilized cell as it passes down the tube divides into two cells which divide into four. This division continues until there is a multitude of cells which cling together in a ball or which somewhat resemble a mulberry in appearance. This later settles in the soft velvety lining of the uterus, where the cells increase rapidly and change in kind. Some of these cells rearrange themselves and become the different parts of the baby's body, some develop into two thin membranes which make a sac around the baby. The space in the sac not occupied by the developing baby is filled with fluid. This sac is called the bag of waters.

The place at which the sac is attached to the uterus grows into a round spongy mass of blood vessels which reach out and project into the uterine wall. This mass is important from the standpoint of the growing baby's nutrition since it can draw upon the mother's blood for food. It is called the placenta and is part of the afterbirth, which is expelled after the baby is born.

The fertilized cell receives its first nourishment from the vitellin or yolk sac, much as an embryo chick does. Later this tissue, by which the developing baby is connected with the placenta, lengthens into what is called the umbilical cord. The baby's nourishment and oxygen are received from the mother's blood through this cord. The waste material, including carbon dioxide, is passed out through the umbilical cord also.



Courtesy of J. B. Lippincott Co.

FIG. 3. The developing baby. These eight figures in this diagram show the size of the developing baby (fetus) in the uterus. For the first few weeks the gain is only about one ounce per month, but by the sixth month the baby's gain is approximately ten ounces per month. During the last two months of normal pregnancy the fetus doubles its weight. From *Mother and Baby Care in Pictures* by Louise Zabriskie, 2d Ed. (1941).

At the end of 2 weeks the developing baby is about the size of a pea, and at 4 weeks it is the size of a walnut. At 12 weeks there is a completely formed fetus, about 3½ inches long, having definite characteristics of a baby with finger and toe nails, eyelids, and teeth beginning to form in the jaw. At the end of 9 months the baby is ready to continue its life in the outside world.

Undoubtedly the mother-to-be is anxious to know just when to expect the baby to be born. Unfortunately, it is impossible to state the exact day. There is no way of knowing when pregnancy began. The baby is usually born about 280 days after the beginning of the last menstrual period. To find the date at which you can expect your baby during the coming year, count back 3 months from the beginning of the last menstruation and add 7 days. Thus, if the last menstrual period started October 3, count back three months to July 3 and add seven days. The baby should be expected approximately July 10. This usually comes within two weeks of being correct. The baby may come a week or two in advance or two or three weeks later. Parents should not be worried if the baby does not come on the date calculated as long as the mother can feel life.

Signs of Pregnancy

One might expect it to be a very simple matter to tell when a woman is pregnant, but this is not always the case. Various tests for determining pregnancy can be made by physicians. These tests are not ordinarily used, but they are of value from a medical standpoint in distinguishing pregnancy from abdominal tumor. The common practice is to judge from some "probable signs" early in pregnancy which are verified later by "positive signs."

Probable Signs of Pregnancy

Aside from tests which could be given by a physician for determining pregnancy, there are certain signs which any expectant mother may detect. They are cessation of menstruation, changes in the breasts, nausea, and frequent urination. Because any one of these symptoms may also occur in a woman who is not pregnant, one indication alone is not significant as a sign of pregnancy. However, if several or all are present, one can feel fairly certain of pregnancy.

Cessation of Menstruation

In the non-pregnant woman, the ovary normally goes through a menstrual cycle each month. To complete a cycle takes approximately 28 days. It includes a period of preparation of the uterus, of bleeding or menstrual flow, and of restoration or rebuilding of the organ, and a period of rest. At the end of this cycle, the ovum is expelled in the menstrual flow. In pregnancy, the ovum is fertilized, becomes embedded in the lining of the uterus, and menstruation stops. This fertilized ovum or cell finally develops into the fetus. There are other reasons for cessation of menstruation, and so this alone cannot be called a positive sign.

Changes in the Breasts

The breasts usually become enlarged and sensitive to touch during pregnancy. There is a deeper pigmentation of the area around the nipple, and this dark-brown color persists throughout the pregnancy.

Nausea

This is the most discussed symptom, probably because it is usually the most uncomfortable. It is sometimes called "morning sickness" because it most often occurs just after rising, although it may occur at any time. One may have a severe nausea with vomiting, a sensation of nausea with no vomiting, or no nausea at all. This symptom is usually more acute during the first three months. For methods of preventing and reducing nausea, see page 135.

Other Probable Signs

Some women notice the need to urinate more frequently than usual. This may be evidenced by the sudden need to get up at night one or more times. An enlargement of the abdomen, as the uterus enlarges, is also a symptom. You will undoubtedly be most conscious of this change.

Positive Signs of Pregnancy

The positive signs of pregnancy occur later than the probable signs. It is usually the middle of pregnancy before the positive signs become noticeable. They are fetal movements, fetal heartbeats, and distinguishing parts of the baby's body.

The first fluttering movements of the fetus are felt by the mother at about four and one-half months after pregnancy begins. Some believe this occurs at exactly the middle of pregnancy and may be used as the sign for determining when the baby will be born. The first movement of the fetus is not very strong and sometimes, in a first pregnancy, is confused with the movement of gas in the intestines. As the fetus develops, the movements become stronger. The last few weeks they may cause discomfort. The mother is protected by the bag of waters with which the baby is surrounded. This bag of waters also protects the baby if his mother falls.

The fetal heartbeat is heard only by the doctor through his stethoscope. The rate and strength of the beat help him determine how the baby is progressing.

It is also the doctor who feels the parts of the baby's body. This helps determine the position of the baby and is especially important toward the end of pregnancy.

Consulting a Physician

Women frequently give no heed to the signs of pregnancy. The wise mother-to-be immediately consults a physician when signs of pregnancy appear, to verify whether she is pregnant. Perhaps you wonder, why see a physician, since reproduction is a normal body function and a healthy, well-nourished individual should be able to go through pregnancy with little or no difficulty. A trained physician is the only one who can tell whether all is going as it should.

Many body changes are taking place. The growing fetus may cause pressure on some organs, and difficulties may arise. A physician, through urinalysis, taking blood pressure, and other tests, can detect potential trouble at the very beginning. This is the time it is easiest to remedy difficulties. It is not fair to your doctor, yourself, or the babe on the way to wait until trouble has become serious before having a physical checkup. Let the doctor help you prevent trouble. Just as you watch and care for your plants to keep them healthy and to protect them from disease, so you should let the doctor check the development of your growing baby.

Nourishing the Fetus

What can I do to make sure that this baby who is coming will be born a normal, healthy individual? Of course there are many things over which you have no control, including the sex of the baby, the color of the eyes and hair, the complexion, and the child's natural stature. However, proper food is essential for the formation of a strong, healthy infant and that is where the parents can help. As already stated, the fetus receives its nourishment from the mother. Therefore, the fetus cannot be properly nourished unless the mother sees that the right nourishment is provided through her own diet, or unless the fetus draws its nourishment from the mother's body. There is probably no period in the development of the child when nutrition is more neglected than during the pre-natal period.

Even the food habits of the father-to-be have their influence. A young couple who were expecting their first baby in 4 months came for advice. We were glad to see the dad-to-be, for we feel that both parents have a responsibility and both should have the pleasure of doing their part for their baby even before he comes. This couple had come to ask about the expectant mother's diet, but as the discussion progressed it was apparent that the diet of the father-to-be needed to be corrected if they were to do the best for their baby. The wife was cooking all 3 meals, but the meals were limited by the fact that the husband did not eat whole-wheat bread or liver and had learned to eat only 3 vegetables. He laughingly remarked, "I guess I was spoiled. My brothers and sisters ate everything, but Dad and I did not."

Analysis of their diet showed it to be low in iron and vitamin B_1 (thiamin). The husband said his wife ate much candy between meals and was troubled with gas.

They were told that now was the time to start eating right for the sake of the baby. The father-to-be agreed to start improving his diet by having one loaf of whole-wheat bread a week, to use whole cereals in place of Corn Flakes, and to eat liver once a week.

In this case the couple might easily have affected the health of both mother and baby by paying too much attention to father's whims.

Good nutrition during pregnancy may have far-reaching and long-lasting effects. It can improve the mother's health, the child's health and development, and even the nutrition of the dad-to-be. Or poor nutrition will work in reverse. The mother may "feel poorly" all during pregnancy and impair her own health so that she is a long time recovering. The fetus may suffer too. Failure to supply vitamin D to the growing fetus makes the baby more susceptible to rickets. An anemic mother tends to produce babies with a low blood count. So both suffer as a result of poor nutrition. The baby, however, is supplied, to some extent, from the mother's tissue when the nutrition is poor. Nature in this way tends to protect the future generation. Therefore, the mother suffers first.

Table 1. Increase in Food Nutrients during Pregnancy

Food Nutrients	Standard Allowance for Women (125-lb, Moderately Active)	Allowance in Latter Half of Pregnancy	Percentage Increase
Calories	2,500	2,950	18
Protein	60 grams	85 grams	42
Calcium	0.8 gram	1.5 grams	88
Iron	12 mg	15 mg	25
Vitamin A	5,000 I.U.	6,000 I.U.	20
Thiamin (B_1)	1.5 mg	1.8 mg	20
Ascorbic acid (C)	70 mg	100 mg	43
Riboflavin	2.2 mg	2.5 mg	14
Nicotinic acid	15 mg	18 mg	20
Vitamin D	?	400–800 I.U.	?

Source of data: Recommended daily allowance for specific nutrients suggested by National Research Council, January, 1943, except for calories.

How can the mother be sure that she is eating properly for the growing baby? Does it mean, as we often hear, that she must eat for two? She must eat for the baby also, but a growing baby does not require as much food as an adult, and so the mother should at no time double her food intake. The question then is how to increase the food intake to supply amply for the baby's growing body.

The food nutrients vary in the amounts of increase, ranging from 14 per cent to 88 per cent (Table 1). The allowances given are for the last half of pregnancy, since 90 per cent of the fetal growth takes place during that period. There is very little increase required in early pregnancy. One of the smallest increases is for calories. The size of the fetus is relatively small; thus its energy requirement would be small. Later energy is also needed for the mother who must carry additional weight. Calcium rates the highest increase. The fetus needs a good supply of calcium for building bones and teeth.

First we will consider how much increase is allowed during pregnancy and why the fetus needs the food. Later will be discussed the foods and diets that will best supply these increases.

Calories

The fetus has a greater need for some nutrients than for others; therefore the percentage increase varies according to the fetal and maternal need. There is no appreciable increase in calorie needs during the first 3 months of pregnancy. From the fourth month there is a gradual increase in the energy need, which reaches 18 to 23 per cent by the end of pregnancy. This is due to increased maternal tissue, the growing fetus, and the increased weight the mother is carrying.

One authority, Root, studied the basal metabolism of his wife at biweekly periods beginning at the fourth month of pregnancy. There was a steady increase in the metabolic rate from the sixth month. Six weeks before the infant was born it was 23 per cent more than at 4 months. A non-pregnant woman, gaining the same weight, would have increased her basal metabolism only 5 per cent. The remaining increase was undoubtedly due to activity of the fetus. [1]

A study by Carpenter and Murlin of 3 pregnant women showed that the basal metabolism just before child birth was equal to those of the mother and child taken separately 3 to 10 days after birth. [2]

There are some who believe carbohydrates are beneficial during the first few months of pregnancy to reduce toxemia. [3] They perhaps would advocate a slight increase in energy foods from the first.

The increase in calories is not very great at any time. A gradual increase, reaching about 18 to 20 per cent, at the end of pregnancy is desirable. The source of calories, so that they will include all the needed nutrients, is important at all times.

Protein

In view of the fact that maternal tissue is increasing and a new body is developing, it is not surprising to find the protein requirement increased by 42 per cent during pregnancy (Table 1). There is ample evidence to prove the need for increased protein, especially during the latter part of pregnancy. Just as protein is needed by the growing child for growth, so it is needed by the developing fetus for growth.

Formerly many authorities were of the opinion that protein caused such troubles as edema and toxemia during pregnancy. Therefore the protein foods such as meat and eggs were reduced, especially toward the end of pregnancy. Toxemia is a condition caused by the presence of toxins or toxic substances in the blood. Edema is a swelling or puffiness due to the accumulation of fluid in the tissues. It may be noted in the feet, hands, or even in the face. More recent experimental work, however, seems to show that the practice of reducing proteins is inadvisable. Thus a study was made of 86 women at the Boston-Lying-In Hospital. A number of these women had had toxemia at a previous pregnancy. The women were given the best pre-natal care so far as was known. Their diets included approximately 100 grams of protein daily, which is 40 grams or two-thirds more than the normal allowance. There were no cases of toxemia within the group. [4]

Today many authorities attribute edema to lowered blood proteins [5], and it is quite common to give high proteins to prevent it. [6] Accordingly, protein is increased rather than decreased during pregnancy. The difficulties which were formerly thought to be due to high protein are apparently benefited by relatively high protein, about 15 per cent of the total calories, in a balanced diet.

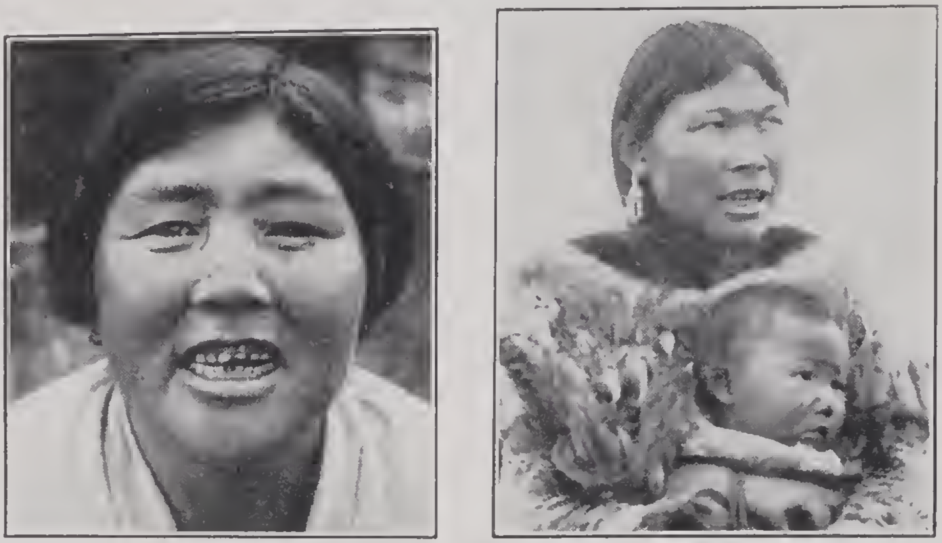
Calcium and Phosphorus

There is an old saying, "A tooth for a child." This was the common way of expressing the effects of pregnancy on the mother's teeth. Is this still true?

The greatest increase for food nutrients during pregnancy is for calcium. It is the only allowance which is nearly doubled, the increase being 88 per cent (Table 1).

The jaws and teeth of the newborn are beginning to form by the end of the third month. The skeleton which is gradually increasing in size requires much calcium as well as phosphorus and vitamins A, D, and C for proper formation. Therefore, if the baby is to start out in this world with the best possible bone and tooth formation, he must be supplied adequately with these elements.

During the first 3 months much of the fetal growth is cellular so that less increase in calcium is needed. The second 3 months there is much more calcification taking place and this requires calcium. Research shows, however, that the greatest period of calcification is during the last 2½ months. [7] This undoubtedly explains the tendency for rickets in premature babies. It also shows clearly the need for supplying adequately the bone-building nutrients during this period.



Courtesy of Dr. Weston A. Price

FIG. 4. Typical native Alaskan Eskimos with no caries. The left-hand figure, the mother of twenty children, has no tooth decay—one tooth is broken. From *Nutrition and Physical Degeneration,* published by Paul B. Hoeber, Inc., Medical Department of Harper and Brothers.

If the mother's intake of calcium is low, she suffers from the deficiency. Nature puts the fetus on the "preferred list" so that it is supplied at the expense of the mother. This is evidenced by the condition of the mother's teeth during pregnancy. Undoubtedly, the fetus robs the mother of any nutrient which is not supplied by her diet. Calcium illustrates most clearly how this functions.

We know many mothers who have gone through pregnancies without losing any teeth. We conclude that if the proper nourishment is provided, it is not necessary to lose a tooth for a child. (For sources of calcium, see Table 5, Chapter II.)

The fact that the mother was expected to lose a tooth for a child is good evidence that the diets were commonly low in tooth-building materials. Traditions sometimes cause confusion in the minds of people. Some persons feel that all traditions are desirable. In fact, one mother, living in India at the time she was having her family of 3 children, thought that she had done better than normal because she lost 2 teeth for each child instead of one. Milk, our best source of calcium, is scarce in India. Medicinal calcium is sometimes given during pregnancy. In fact, the dentist recommended giving calcium lactate to the older children but did not suggest it for the pregnant mother. Not understanding nutrition or the cause of losing her teeth, this mother thought that she had done better than usual by her children.

In conrast to the mother living in India, an Eskimo woman gave birth to twenty children and had no cavities in her teeth. For native Eskimo diet, see page 27.

Missionaries visiting here say that in some countries where milk is scarce bones are cooked in acid such as rice vinegar and given to pregnant and lactating women.

Phosphorus is also essential for good skeleton formation as is vitamin D. Phosphorus is more widely distributed in foods than calcium. If the calcium and protein are adequately supplied, the phosphorus is usually sufficient also. (For sources of phosphorus see Table 6, Chapter II.)

Iron

Why do many mothers-to-be so often look pale and anemic? Studies show that anemia is frequently present, especially toward the end of pregnancy. Must this be part of the picture? Unless the mother includes about one-fourth more iron than is normally needed, she may be anemic and the fetus may suffer. A study with swine showed iron deficiency to be the probable cause of stillbirth. [8]

The growing baby needs iron for his body as it develops, particularly for the formation of blood and muscles. In addition to this, infants have a reserve store of iron at birth.

According to work done in 1899, and additional analytical figures obtained later, the proportion of iron to fetal weight is fairly constant. There is a great increase in weight of the fetus the last 3 months of pregnancy and consequently a large increase in iron deposition. The mother transfers an average of about 0.4 milligram daily during the first 6 months of pregnancy. During the last 3 months, however, the fetal iron is greatly increased. The amount deposited daily is about 10 times the previous amount or approximately 4.7 milligrams daily. [9, 10, 11] This undoubtedly explains the prevalence of anemia at an early age in premature babies. Figure 5 shows how babies born prematurely would tend to have a small reserve of iron. The iron content of the infant at birth shows a reserve of about 186 milligrams. [9] The infant needs this reserve to carry him through the first few months of life before he can eat foods that are good sources of iron. Mother's milk is a good source of iron. Cow's milk is not. Table 8, Chapter II, gives good sources of iron. With the exception of egg yolk these foods are not suitable for a young baby. The reserve supply is nature's way of taking care of this fact. The mother-to-be, however, can eat an abundance of the iron-rich foods and thus give iron to the fetus. If his iron is low at birth, the baby will certainly be anemic in early life. Building up this deposit of iron in the fetus may account for the tendency of pregnant women to become anemic.

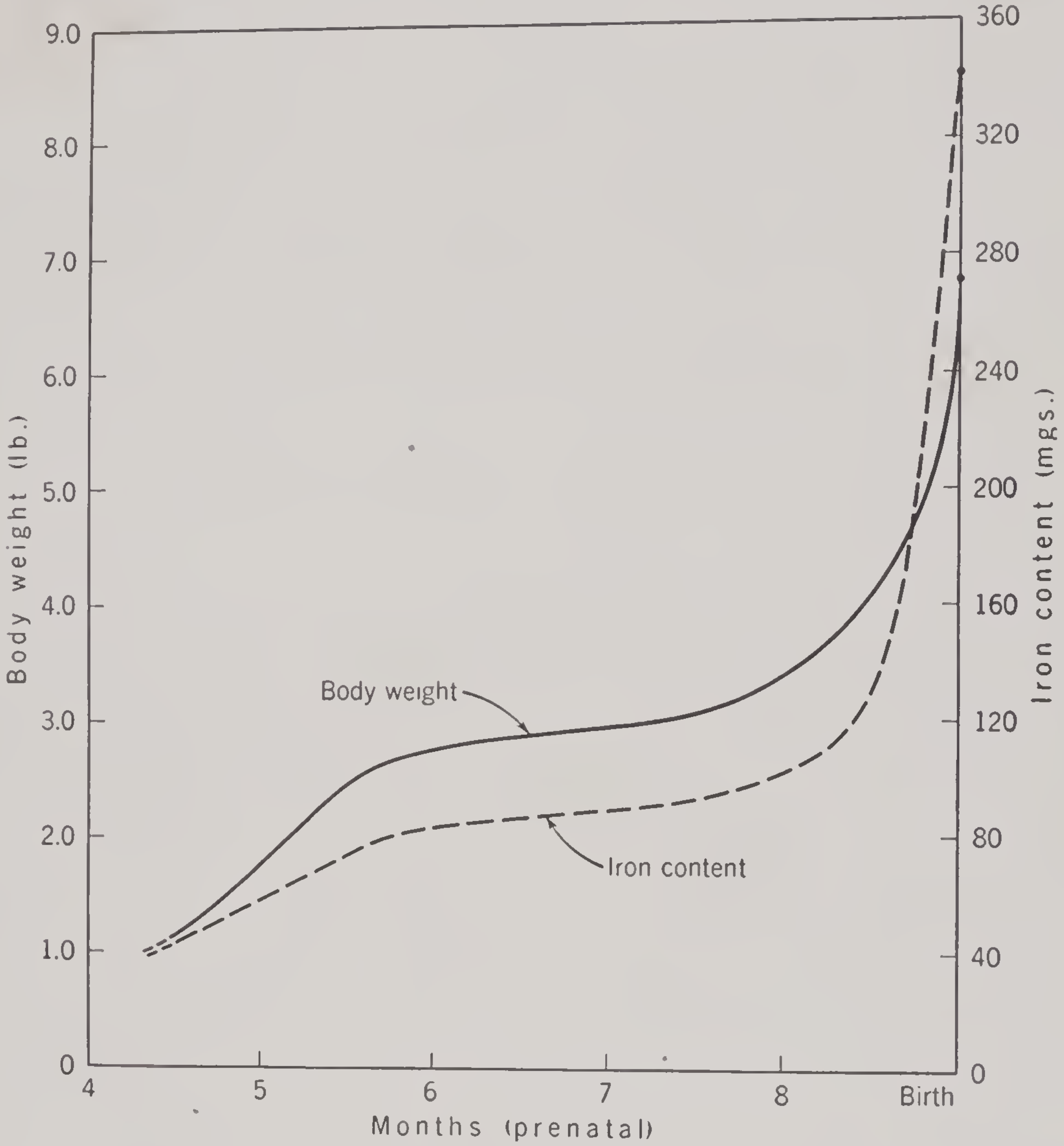


FIG. 5. Fetus at different ages. Comparison of body weight and iron content Source of data: The determination of iron in the human fetus at different ages by Hugounenq and analytical figures of Brubacker and of Camerer and Soldner.

Expectant mothers, writing for advice, realize that anemia is a problem. One mother writes, "I do want the next baby to do as well as Jack. Since I have had trouble with my digestive apparatus the first three months, I'm afraid we've had to start with a handicap; consequently I am more anxious to compensate for it. I am getting along splendidly now and am up tc weight. Anemia has always been a problem with me. Are tonics considered helpful or are the best results obtained by diet alone? What foods would you suggest?"

The mother was told that tonics might be helpful but it was suggested that she try an iron-rich diet first. She was to include an egg and lean meat daily, with liver once or twice a week, green vegetables 3 or 4 times a week, and apricots and molasses frequently. She was advised to have her doctor check her blood count and hemoglobin to note improvement.

Certain studies by Burke and co-workers show a definite relationship between the amount of iron in the mother's diet during pregnancy and her hemoglobin value during and following pregnancy, as well as that of her baby's at birth. A group of mothers whose diet during pregnancy was rated "good" or "excellent" in iron showed less drop in the hemoglobin level during pregnancy than did those taking a diet rated "fair" or "poor" in iron.

They relate the story of one mother whom they studied through 3 pregnancies. About the end of the sixth month of her first pregnancy, her diet rating was "fair" in iron. Her rating improved to "good" by the end of this pregnancy. During the second pregnancy her diet rated "good to excellent" in iron and she received iron medication from the sixth month on. Her diet was "excellent" in iron between the second and third and throughout the third pregnancy. She received no iron medication during the third pregnancy. Her diet included liberal amounts of such foods as liver, apricots, molasses, lean meat, leafy greens, whole-grain bread, and cereal. She showed a higher hemoglobin level at each pregnancy than she had previously. Likewise the hemoglobin level of the 3 children in the first 6 months of life improved with each child, the first child having the lowest hemoglobin level and the third child the highest. [4] Hence we conclude that iron-rich foods are sufficient for maintaining a high hemoglobin level.

Iodine

Remember the pigs that were born hairless and were dead or died soon after birth? This difficulty could have been remedied by giving iodine during pregnancy, as was shown with the litter of pigs after the mother was given iodine.

A relationship between iodine deficiency and human stillbirths was discovered as early as 1901. Success was reported in reducing stillbirths by giving potassium iodide. In addition, beneficial effects were also noted in the children after birth. [12]

A survey made of the medical records of Canada showed a small percentage of stillbirths among the Indians of British Columbia. The food of the Indians is almost entirely salmon, salmon eggs, and sea weed, all of which are rich in iodine.

Recent research in Oregon has been reported to show iodine to be important during pregnancy. Small quantities of iodine were given expectant mothers. They were compared with other mothers who received medical care but no iodine. There were among those given iodine fewer abnormalities of labor than among the others, and these mothers were better able to nurse their babies.

In view of these reports it seems that iodine, even though needed in minute quantities, is highly important. This fact is just beginning to be realized. Authorities have not yet established a definite requirement.

Seafoods, iodized salt, and cod-liver oil are good sources of iodine. Medicinal iodine, of course, should be taken only on the advice of your physician.

The Vitamins

Vitamins are important in life before birth as well as after birth, but research has given us less information on the exact functions they perform in fetal development. Presumably these functions are similar to those of childhood. The presence of the vitamins is unquestionably needed if the mother is to produce a healthy baby and maintain her own good health.

Vitamin A is required for growth, for normal functioning of tissue and to prevent infection. Studies show that additional vitamin A is needed for successful reproduction, beyond the amount needed for promoting growth. Rats fed vitamin A, sufficient for maintenance and growth, still had an insufficient amount for reproduction. Many authorities believe that vitamin A is as necessary for fetal growth as for the newborn and that stillbirths and reabsorption of the fetus will result from a deficiency of it. [13] (For good sources of vitamin A, see Table 11, Chapter II.) If skimmed milk is used in place of whole milk, a considerable amount of vitamin A is lost from the diet. This can be compensated for by increased use of butter or by taking fish-liver oil, fat fish, or green or yellow vegetables.

Vitamin B_1 (or thiamin) stimulates the appetite and tones up the muscles of the digestive tract. Constipation is a common disturbance during pregnancy, and so additional thiamin might well prove beneficial. Because thiamin plays an important role in the metabolism of carbohydrates, more thiamin will be needed as calories are increased. (For good sources of thiamin, see Table 13, Chapter II.)

Recent studies made on pregnant women show a marked increase in the need for vitamin C. [14] Vitamin C is needed in the early formation of the teeth. Teeth are beginning to form as early as the third month of pregnancy, and the amount of vitamin C should be increased at that time.

Throughout later pregnancy it should be increased further. (For sources see Table 16, Chapter II.)

The expectant mother may have an ample supply of calcium and phosphorus for good skeleton formation for the fetus, but this is not sufficient. Vitamin D is necessary for the proper utilization of these minerals. History shows that cod-liver oil, an excellent source of vitamin D, has been in and out of vogue several times. As early as 1807, cod-liver oil was used effectively for women who were worn out with rheumatism after child birth. The author concludes that the "rheumatic" pains were undoubtedly due to calcium deficiency, causing calcium depletion in the bones. [15] The exact vitamin D requirement for an adult is unknown, but its need is definitely established in pregnancy. While the fetal skeleton is being formed, more vitamin D will be needed from sunshine or food than under usual conditions.

Vitamin D, according to research, affects the duration of labor. A study was made of human mothers on normal diets. Comparison was made of 132 primae (first-child) patients who were given a vitamin D supplement during pregnancy, with 63 who were given no supplemental vitamin D. The average duration of labor was 6 hours for the group receiving the vitamin D supplement, whereas it was 19 hours for the control group. [16]

In the olden days childbirth might have been easier if the moral code had allowed the mother-to-be to get plenty of fresh air and sunshine. Apparently, the peasant, who was not worried about being seen and who worked in the fields, had an easy time at childbirth. A foreign mother, of our acquaintance, who stood looking at *The Song of the Lark,* said, "I used to look just like that when I worked in the fields in the old country." She had such an easy time at childbirth that her baby was born in the field. Of course, this was not due to an abundance of vitamin D alone, but vitamin D undoubtedly helped. A diet of natural foods and exercise to make strong muscles were contributing factors. (For sources of vitamin D, see Table 12, Chapter II.)

Riboflavin is a rather recent discovery, and so its relation to pregnancy is not yet well established. However, it has been proved to be essential for growth; therefore an increase of riboflavin is recommended. (For sources, see Table 14, Chapter II.)

Vitamin E is undoubtedly necessary in pregnancy. Studies with female rats show reproductive difficulties resulting from deficiency of vitamin E, such as reabsorption of the fetus. Because of the stability of vitamin E and its wide occurrence in natural foods, supplying sufficient amounts should be no problem.

An abundance of vitamin K is desirable especially because it aids in the clotting of the blood. For sources, see Chapter II, page 56.

Niacin is the pellagra-preventing vitamin. The National Research Council suggests a 20 per cent increase in this vitamin during the latter part of pregnancy. (For sources, see Table 15, Chapter II.)

Many authorities believe that abortions, premature births, and fetal deaths late in pregnancy are indications of lack of vitamins generally in the diet. [17]

Calories, protein, vitamins, and minerals are needed for good health always. An additional supply of all is important during pregnancy.

The effect of nutritious food on the mother and the newborn baby is shown in a study of women attending a prenatal clinic in Toronto. Analysis of the diets of about 380 pregnant women from the low-income group revealed that the diets were low in protein, calcium, ascorbic acid, and thiamin. The women on poor diets were divided into two approximately equal groups. Both groups continued on the poor diet, but one group was given food to supplement its poor diet. The diets were improved by the addition of the following foods: milk, egg, orange, tomatoes, viosterol, cheese, and wheat germ.

During the prenatal period it was found that there were twice as many cases of anemia, toxemia, and threatened miscarriage in the poor-diet group as among the better-fed women. The complications affecting the mother and infant were greater in the poor-diet group than in the supplemented-diet group; there were more miscarriages, stillbirths, premature births, and infant deaths. There was more illness among babies born of mothers on poor prenatal diets, and although the babies received the same food and the same attention after birth, at six months of age the babies of the better-fed mothers were much healthier. [18]

The following illustration shows how one mother by improving her diet was able to produce a healthy child successfully. A doctor tells of a woman who went through four consecutive pregnancies, and each time the child died at birth or shortly after. The death was due to hemorrhagic (bleeding) disease in the first three newborn infants and possibly in the fourth. During the fifth pregnancy the mother's diet was made more adequate. She was given a diet high in protein, lipins (fats and fatlike substances), and fat-soluble vitamin A. These were thought to play an important part in the clotting of the blood. Her revised diet included acidophilus milk, eggs, and visceral organs such as lung, kidney, testes, brain, heart, pancreas, and liver. Base-forming fruits and vegetables were given to neutralize the acidity produced by the high-protein diet. Excess alkalinity is favorable for a positive calcium balance. On her new diet the mother's blood became normal and a non-bleeding baby boy was delivered at full term. [19] Today we might say that vitamin K played an important part in this story since it aids in the clotting of the blood and since it is found in visceral organs and green vegetables. At any rate, it is important that when the mother's diet was improved she was able to produce a normal healthy baby.

Diet in Pregnancy

Providing proper nourishment for the growing fetus is the most important responsibility of the mother-to-be. What foods will best supply these increased nutritional demands?

It is assumed that the woman entering pregnancy is in a healthy nutritional state and on a good diet. Table 2 gives a day's diet for a nonpregnant, moderately active woman weighing 125 pounds.

Ways in which the additional needs of pregnancy can be supplied by natural foods is shown in Table 3. These foods are to be taken in addition to her normal diet as was given in Table 2. A pint of milk or 2½ ounces of cheese, a green vegetable, and a serving of fruit, fresh or dried, is a simple plan that fairly well answers the additional needs.

The mother may find it difficult to take three big meals a day, especially in the latter part of pregnancy. In this case some of the food may be taken between meals, such as whole-wheat bread and milk, or milk as egg nog, a cheese sandwich, or fruit and milk. Table 4 shows how these foods can be included in the daily diet.

A pint of milk supplies the larger proportions of the increased needs of calcium, proteins, vitamin A, riboflavin, and calories. It is not necessary to drink one quart of milk daily, part may be used in cooked foods such as soups, gravy, pudding, or frozen desserts. Buttermilk may be used for part of the milk. Solid cheese is a good substitute for the elements supplied by milk.

The green vegetables add large amounts of iron and vitamins A and C. The serving of fruit may easily supply the needed vitamin C. In summer vitamin D can be supplied by sunshine. If regular foods do not supply sufficient quantities of vitamin D in winter, some vitamin D supplement should be used.

The allowance for nicotinic acid during pregnancy should be increased 20 per cent over the normal allowance. (See Table 1.) Table 3 does not show the niacin (nicotinic acid) content of these foods since niacin is of too recent discovery to have figures available. If all the other food requirements are met the requirement for niacin will undoubtedly be met also. Probably it is adequately supplied by any of the three plans since milk and green vegetables are good sources of niacin.

Nature is building a new individual during pregnancy. Only the mother can supply the needed building materials for this growing body. Let us

Table 2. Diet Giving Standard Allowance Non-Pregnant, Moderately Active Woman, 125 Pounds

Food	Amount	Calories	Protein	Minerals		Vitamins			
				Calcium	Iron	A	Thiamin	C	Riboflavin
			grams	*percentage of daily allowance*		*I.U.*	*micrograms*	*milligrams*	*micrograms*
Breakfast									
Cantaloupe	½ cup	27	1	2	3	300	60	30	60
Toast, whole-wheat	2 slices	150	6	6	8	.....	168	0	50
Butter	1 tbsp	100	0	0	0	312	.....	..	.....
Bacon	2 medium slices	67	2	0	3	2	22	0	.....
Egg	1 medium	80	7	4	13	500	75	0	165
Coffee	1 cup	0	0	0	0	0	0	0	0
Sugar	2 tsp	33	0	0	0	0	0	0	0
Cream 40%	2 tbsp	120	1	4	0	374	19	..	.....
Lunch									
Squash, summer	½ cup	19	1	2	3	1,000	45	..	45
Tomato, sliced	1 small	21	1	1	3	1,100	78	23	60
Lettuce	1 leaf	2	0	0	0	12	10	..	6
Mayonnaise	1 tbsp	100	..	..	1	35	4	2	8
Bread, whole-wheat	1 slice	75	3	3	4	.....	84	0	25
Butter	1½ tbsp	150	0	0	0	468	.....	..	.....
Cake, sponge	1 large piece	200	6	4	10	.....	10	..	.....
Sauce, chocolate	4 tbsp	200	1	..	..	.....	.....	..	.....
Milk	1 cup	170	8	36	4	268	146	2	549
Dinner									
Beef heart	3½ oz	248	15	1	19	.....	600	..	900
Potato	1 medium	100	3	2	9	36	144	16	54
Beets, buttered	2 medium	46	2	4	8	0	45	5	30
Butter (for vegetable)	2 tbsp	200	0	0	0	624	.....	..	.....
Peaches, sliced	2 medium	102	2	2	6	2,000	60	20	120
Cream 18.5%	½ cup scant	200	2	12	2	612	30	1	204
Milk	1 cup	170	8	36	4	268	146	2	549
Total		2,580	69	119	100	7,911	1,746	101	2,825
Allowance according to the National Research Council, January, 1943		2,500	60	100	100	5,000	1,500	70	2,200

Table 3. Three Ways To Fulfill Nutritional Needs during Pregnancy

(Suggested Additions to Diet of Normal Woman)

Food	Amount	Calories	Protein	Minerals		Vitamins *			
				Calcium	Iron	A	Thiamin	C	Riboflavin
			grams	*percentage of daily allowance*		*I.U.*	*micrograms*	*milligrams*	*micrograms*
Plan I									
Milk	1 pint	340	16	72	8	536	292	4	1,098
Peas, green	¾ cup	100	7	3	18	1,000	420	25	195
Grapefruit	½	100	2	8	7	0	131	81	.....
Total		540	25	83	33	1,536	843	110	1,293
Plan II									
Cheese, American	2½ oz	300	21	81	9	1,380	30	..	519
Brussels sprouts	5 to 6 sprouts	58	4	3	10	200	180	75	.....
Apple	1 medium	80	1	2	6	128	77	9	51
Total		438	26	86	25	1,708	287	84	570
Plan III									
Apricots	9 halves	100	2	3	23	1,800	32	1	38
or Spinach	½ cup	24	2	10	22	9,000	111	70	225
Bread, whole-wheat	2 slices	150	6	6	8	.....	168	0	50
Milk	1 cup	170	8	36	4	268	146	2	549
Cheese, soft cream	3 tbsp	150	6	19	6	914	.....	0	78
Total, using spinach		494	22	71	40	10,182	425	72	902
Increases suggested †		450	25	88	25	1,000	300	30	300

* The pregnant woman should get fat fish once a week, one hour in sunshine, or fish oil daily.

† By National Research Council.

not fail in our first obligation to this little individual who is fully dependent upon us. A few natural foods added to an adequate diet will supply the needs. The additions are important, and, since they are easy to include, should not be neglected.

Table 4. How Additional Needs during Pregnancy Can Be Included in the Day's Diet

Menu I from Table 2 for Non-Pregnant Woman	Incorporating in Day's Diet Suggestions from Table 3		
	Plan I	Plan II	Plan III
Breakfast Cantaloupe Toast, whole-wheat Butter Bacon Egg Coffee Sugar Cream	*Breakfast* Same as Menu I *Mid* A.M. 1 cup milk ½ grapefruit	*Breakfast* Substitute 1 cup milk for coffee in Menu I or include both *Mid* A.M. 1 apple Cheese sandwich	*Breakfast* Same as Menu I plus 1 cup milk *Mid* A.M. Apricots Cream cheese sandwich
Lunch Squash, summer Tomato, sliced Lettuce Mayonnaise Bread Butter Cake, sponge Sauce, chocolate Milk	*Lunch* Same as Menu I *Mid* P.M. 1 glass milk 1 slice whole-wheat bread	*Lunch* Same as Menu I *Mid* P.M. 1 glass milk	*Lunch* Same as Menu I *Mid* P.M. 1 glass milk
Dinner Heart, beef Potato Beets Bread, whole-wheat Butter Peaches Cream Milk	*Dinner* Add peas to Menu I	*Dinner* Add Brussels sprouts to Menu I	*Dinner* Same as Menu I

If the mother's diet has been poor preceding this pregnancy, more changes will be necessary than for the well-fed woman. Her diet first must be made adequate for herself and then additions made to meet the demands of the growing fetus.

There are many mothers who pay little or no attention to their diet during pregnancy and one wonders, "How does it happen that so many really healthy babies are born?" Nature will, if possible, provide first for the growing child even though the mother's body suffers as a result. When the mother's diet fails to supply the needed nourishment for the fetus, it is to some extent, taken from the mother's body. The mother suffers from diet deficiency before the fetus. As stated before, it is not necessary for the expectant mother to sacrifice material from her own body to build that of the baby if she is properly nourished.

Craving Foods

Craving foods is often spoken of as a peculiarity of pregnancy. From our observations we conclude that pregnant women on well-balanced diets seldom evidence unusual craving for foods. It is possible that if one is on an unbalanced diet she may crave the foods her body needs. One woman who was put on a very low meat diet during pregnancy craved meat to the extent that, as she later confessed, when sure no one would see her she would satisfy her craving by eating meat.

We know of no reason why food craving should not be satisfied in moderation. Naturally, one should not indulge in a certain food to the exclusion of other needed foods.

Gain in Weight during Pregnancy

Mrs. Smith gained 50 pounds before Doris was born. Mrs. White gained only 15. Which gained the proper amount? Both might be right for the individual concerned.

Individuals vary in the amounts they gain. The mother-to-be to the left in Fig. 6 expected her baby in 3 months while the one to the right expected hers in a few days.

If thin and underweight before pregnancy, you may properly add more pounds than your friend who was up to weight or a little overweight. This does not necessarily mean that your baby will weigh more than your friend's, because some of the gain may be what your body needed and will be maintained after the baby is born, and some additional may be eliminated. Eat a diet giving an abundance of nutritious foods and do not be too concerned about gain in weight. It is normal to gain. If you are under the care of a good physician, he will decide when the mother-to-be is gaining too much or too little.

Mothers gain from 10 to 50 pounds, the most common gain being about 20 or 30 pounds. There is usually no gain in weight during the first 2 or 3 months, in fact, there may be some loss in weight, especially if one suffers digestive disturbances. The greater part of the gain is made during the last 3 or 4 months of pregnancy.

The food you eat determines to a considerable extent the amount you gain. If gaining too much, reduce the sweets and starches in your diet. Unsweetened fruit is an excellent dessert for one gaining too rapidly. Do not omit foods such as milk, eggs, fruit, vegetables, whole-grain cereals, meat, and fish. If you continue to gain weight rapidly, consult your physician. Excess food is not the only cause for gaining weight. It may be due to some other factor, as excess water retention. In such cases your physician will suggest the best course to follow.

FIG. 6. Two normal, pregnant women.

Reducing the Size of the Fetus

Some mothers wish to keep the size of the fetus small, believing that to do so will result in easier childbirth. Many mothers have given birth easily to babies weighing 8 to 12 pounds. This leads us to conclude that the size of the baby is not the most important factor determining whether or not the mother will have an easy or difficult time at childbirth. Hence, dieting to reduce the size of the fetus is not recommended. It may result in harm to the mother and to the baby, too.

We do not advocate fat babies or for the mother to put on layers of fat during pregnancy. There is little danger of the baby's being too fat if the mother is on a well-balanced diet and does not overeat. It is possible to get the habit of continually overeating. We believe that if the baby is to have a large frame, he will be born with a large frame regardless of any effort on your part to reduce the fetus by dieting. Serious consequences to the mother and child may result on too low a food intake during pregnancy.

Mrs. Dennis is the mother of two daughters. She dreaded childbirth and asked the doctor how to diet so as to have a small baby. According to her story, during the first pregnancy she received no milk, cheese, or cod-liver oil. She ate meat sparingly and fish seldom. She lived in a mining town where there was little sunshine. Her daily diet included one green vegetable, one other vegetable, one-half slice of whole-grain bread, prunes with 2 tablespoons of bran, one other fruit, many apples, and 1 pint of sour lemonade. During the last 2 months of pregnancy she drank lime water. The mother lost weight and had a hard, dry birth. The baby weighed 6 pounds and 12 ounces, which is approximately average weight. The mother said her teeth were "terrible" after the baby was born and that much of her hair fell out. The baby was breast fed for 6 months, but the mother reports that the child never did what she was supposed to. She did not double her birth weight by 6 months nor triple it by 1 year. She had dysentery at 8 months and pyelitis at 1 year. At nursery-school age the child's temporary teeth were very bad. She was tall for her age, but about 4 pounds underweight.

A second daughter was born 2 years after the first. The mother was discouraged over her unsuccessful attempt to ease childbirth at the time of the first child, and so she made no attempt to reduce the size of the fetus this time. The mother's diet was much improved. Her daily diet included 1 glass or more of milk, a little cheese, green vegetables, other vegetables, a little whole-grain cereal, fish three times a week, very little meat, prunes with bran, and one other fruit. She ate very little bread and potatoes, but a great deal of hominy grits. The mother lived in the South and was out of doors much; so probably she received adequate vitamin D from the sunshine. She had an easy time at childbirth and the baby weighed 8 pounds and 4 ounces. This baby made regular gains during her first year.

Diets have been prescribed at different times with the hope of producing a small baby. The reason given for such procedure is that the baby will pass through the pelvic outlet more easily than a larger baby, thus giving the mother an easier time at birth. Mrs. Dennis and many others have found this not to be true.

The "Prochwnick diet" is one that has been used for this purpose. The diet follows: *Breakfast*—3 ounces of coffee, 1 ounce of bread, 1 tablespoon of butter; *Dinner*—meat, fish, or 1 egg with a little sauce, vegetable cooked with butter or cream, lettuce, and a small piece of cheese; *Supper*—same as dinner, with 1 ounce of bread, a little butter, and a little milk. Forbidden foods were soups, pastry, sugar, beer, and potatoes. Water was allowed up to 1 pint a day, or a little white wine up to 14 ounces. [20] An exact analysis of this diet is impossible since definite amounts were not given. The calories would certainly be low; the proteins, vitamins, and mineral contents would vary with the kind of meat and vegetables and the size of the serving. Protein probably would not be sufficient for a pregnant woman. Calcium would undoubtedly be low since two small pieces of cheese and a little milk could not possibly meet the daily allowance. Calcium and protein being low, phosphorus would probably be low also. We would expect all the vitamins to be low, although it would be possible to meet the vitamin A and C requirements on certain days (but certainly not continually) with a careful selection of vegetables. The same would be true of iron. A diet such as this, with the proteins, minerals, and vitamin contents low, sounds like an excellent way to give the baby a poor start in this world, as well as to ruin the mother's health.

Factors Other Than Diet To Consider During Pregnancy

The food of the mother during pregnancy is important to her and to the developing baby. If the mother is to make the best use of the food she consumes, she should be in a good state of health. Some factors which may greatly influence her state of health and well-being are exercise, fresh air and sunshine, sleep and rest, her mental attitude, the clothes she wears, and habits such as smoking and drinking.

Exercise and Fresh Air

The best care a mother can take of the baby before he is born is by taking care of herself. One good method for keeping her digestive system in order and promoting the best activity of her internal organs is outdoor exercise daily. Exercise is one of the best stimuli for the excretory organs. Constipation is a common disturbance which exercise may help overcome.

The food we eat cannot be used in the body without oxygen. The mother must take enough oxygen into her lungs for both herself and her baby. Accordingly, we recommend that the home be well ventilated at all times and that she spend some time each day out of doors. If sunshine is available, she should make use of it so that the baby can be supplied with more vitamin D.

The kind of exercise the mother takes will depend upon her previous activities. If she has been accustomed to a sedentary type of life, she should not indulge in too strenuous activity. If she is in the habit of swimming, playing golf, and tennis, she should be able to continue these activities. Walking is a good type of activity throughout the whole period of pregnancy. It is sometimes wise to give up the more strenuous activities after the fifth month of pregnancy. Frequently, however, mothers are inclined to slip into too sedentary a type of life, especially after the fifth month of pregnancy. With an extra 15 to 20 pounds of weight to carry, an easy chair looks so comfortable that the path of least resistance leads to using it too much.

Some expectant mothers feel that they should accumulate rest in preparation for labor at childbirth. Keeping the body fit is a much better way to prepare than sitting around taking life "too easy" and failing to get sufficient exercise. In fact, the easy program of preparation probably will result in a more difficult childbirth than if the woman lived and exercised normally.

The mother of several children, if she is doing most of her housework, will feel that she is getting plenty of exercise. However, a change of environment and the relaxing effect of a walk outdoors or some gardening will do much in giving her a "new lease on life."

Outdoor exercise tends to stimulate the appetite, steady the nerves, quiet the mind, and usually makes one sleepy. The walk should also strengthen some of the muscles used during labor. Indoor work may well form part of a pregnant woman's exercise. If she has been in the habit of doing her housework before pregnancy, she should be able to continue to do most of it during pregnancy. It is a good type of exercise but should not wholly replace outdoor exercise. The amount and type of work the expectant mother may do will depend upon her physique and the amount of work she has been accustomed to doing. She should never continue work or exercise to the point of fatigue. She should stop when nature gives the tired signal.

Rest and Sleep

A mother tires easily during late pregnancy. This is not surprising when we consider the extra weight she is carrying. Therefore it is wise to take rest periods during the day. She may prefer to take several rest periods of 10 or 15 minutes at regular intervals or to take one long nap following the noon meal. She should not let herself become overtired. The mother herself will have to decide how much rest and sleep she needs and how it can best be fitted into her schedule. If the expectant mother has difficulty in going to sleep, she should check her activities and her naps. Working too strenuously or for too long a time may easily overtire her, or too long a nap may cause difficulty in going to sleep. On the other hand, if the mother gets very little or no exercise, she may also have difficulty in going to sleep.

Moderate activity, easily digested food, a bedroom in which the air is allowed to circulate, and a warm drink at bedtime are all conducive to sleep.

Mental Attitude

The mental attitude of the mother is another factor which affects her well-being during pregnancy. She should, so far as possible, live as before and not be concerned with the fact that she is pregnant. Probably the first requirement for keeping a peaceful, happy frame of mind is not to worry. This, of course, is much easier to say than to do. Continuing with the type of work you are in the habit of doing will help a great deal, thus keeping yourself occupied physically and mentally. Do not be too watchful for the common disturbances of pregnancy. It is possible for you to go through pregnancy and have none of them.

An old superstition which caused much worrying by expectant mothers was fear of marking the baby. Supposedly, if the mother witnessed a terrible sight, or was afraid of an animal, or even craved foods, she might mark her child to resemble these sights, animals, or foods. Thus some children's faces were said to resemble somewhat that of an animal. Birthmarks in the shape and color of strawberries or blackberries were thought to be caused by the mother's craving these foods. There is no scientific basis for believing these superstitions. In fact, the fetus is often completely formed before the mother knows she is pregnant. The only influence the mother has over the growing child is through nourishment.

Pregnancy is sometimes thought of as abnormal. The mother-to-be then tends to take the attitude of a semi-invalid and expects to be treated as such. Accepting pregnancy as a normal condition usually results in the mother-to-be "feeling better." We frequently hear, "I feel better than usual." This may easily be true if she is on a healthier regimen than usual.

Various forms of recreation will help keep the mother from being depressed and worrying about herself. The father-to-be can help the mother's mental attitude by providing a variety of recreation. The mother who stays by herself continually may become too self-centered and thus become depressed. Picnics, movies, hikes, going out to dinner, and having guests may all help keep the mother in a pleasant frame of mind.

Clothing

The clothing of the expectant mother should be simple, attractive, and comfortable. One feels more conspicuous during pregnancy because of the increase in size. Therefore it is important from a psychological point of view for the mother-to-be to feel that her clothes are neat and attractive. The clothing need not be expensive irrespective of whether the mother buys them ready made or makes them at home.

It is important that the clothing be comfortable. The weight of the clothing should be in accordance with the weather. There should be no tight belts, garters, or shoes. Comfortable shoes are of the utmost importance because of the added weight to be carried. Ill-fitting shoes and run-over heels cause one to tire more easily and may prevent one from taking the needed exercise. Broad heels are advised. High heels make it more difficult to walk, cause backaches, and increase the risk of tripping or turning the ankles and falling.

Abdominal supports are a matter of controversy. If one is in the habit of wearing some support, she will probably feel the need for one during pregnancy. A physician can best advise on this subject.

The father can help to make parenthood a fifty-fifty proposition by providing the mother-to-be with suitable attractive clothes. She will feel more like continuing her interests, as she should, if she is well dressed.

Alcohol and Smoking

Mothers frequently want to know if smoking in moderation and an occasional drink will harm the coming baby.

The experimental work of several people indicates that alcohol acts as a specific poison to the germ plasm. Another scientist shows that alcoholic excess decreased productivity and increased stillbirths. It also increases the production of weaker and defective offspring. [21]

A study was made of the fetal heart rate before and after smoking. The increase in the fetal heart rate appeared to be due to the passage of the toxic product of tobacco smoke into the fetal circulation where it affects the fetal heart rate in the same way in which the adult heart rate is affected. [22]

Another study was made by sending questionnaires to leading obstetricians of this country to determine whether or not they felt that smoking had a detrimental effect on maternal health. An analysis of the 75 replies received indicated an opinion unfavorable to smoking among expectant mothers except in moderation. Some authorities believe that in many cases there is a strong susceptibility to nicotine and that complete abstinence is highly desirable. One authority, in observing women who were not excessive smokers, says that the nervous, digestive, respiratory, and circulatory systems are noticeably affected. He believes that nearly all the important functions of the body are to some extent disturbed by excessive smoking or from susceptibility to nicotine. [23]

The injurious results shown by experiments were from excessive amounts of nicotine and alcohol. Effects of a moderate amount are difficult to test. Therefore the wise mother who wishes to give her child the best care will refrain from using them during pregnancy and lactation.

Disturbances Common to Pregnancy

We have mentioned that the mother can definitely affect the fetus through the nourishment she provides. We should also consider the effect of the fetus on the mother or how pregnancy may affect the mother. There are disturbances common to pregnancy, such as nausea, heartburn, swelling of the feet and legs, muscle cramps, varicose veins, and constipation. The expectant mother may suffer from any or all of these discomforts or she may have none of them. Faulty food habits may be responsible for these discomforts or they may be caused by the pressure of the growing fetus. These symptoms should be reported to your physician.

Nausea

Nausea often occurs during the early months of pregnancy. It may start as early as the first week, but more often it is about the sixth week. It usually lasts through the third month but may continue beyond this. Nausea may be caused by emotional upset, by food, by the changes taking place in the body, or it may be imaginary.

If one is emotionally upset it may lead to digestive disturbances, which may result in nausea. The body is going through many changes during pregnancy and therefore may find it difficult to "handle" some foods. To avoid nausea it is well to omit greasy foods, fried foods, and rich desserts from the diet and not to overeat.

Lack of sufficient carbohydrates may cause acidosis and be associated with nausea or vomiting. For this reason foods such as crackers and dry toast are sometimes recommended for relieving nausea. Taking a warm drink before rising often prevents it. Many are benefited by eating easily digested foods at frequent intervals, every hour or two or adding a midmorning and midafternoon meal to the three regular meals. If this symptom is severe or persists, report it to your physician.

One woman, after hearing a lecture on pregnancy, came for suggestions for her daughter who was pregnant and troubled with nausea. The daughter had omitted one food after another from her diet in an effort to eliminate the one causing the trouble. By eating less food she was increasing her difficulty. When she added a midmorning and midafternoon lunch the nausea disappeared.

Nausea has been spoken of so often in connection with pregnancy that many mothers-to-be look for this symptom to appear. If you expect to be in ill health, you probably will not be disappointed. Keep your mind occupied and do not look for difficulty.

Heartburn

Heartburn is a burning sensation, starting in the stomach and rising into the throat. It is caused by too much acid in the stomach. Heartburn is very unpleasant and can often be prevented by taking thin cream or milk between meals, avoiding greasy or fried foods, and not overeating. Frequent smaller meals are preferable to overeating at one meal.

Swelling of the Feet

Swelling of the feet and hands may occur during pregnancy. The swelling of the feet is most common and may be a result of pressure or it may be due to the added weight which one must carry. The swelling may be slight and cause no particular discomfort. If it is more severe, one may usually relieve the discomfort by lying down and elevating the feet. These symptoms of swelling may be a danger signal and therefore should be reported to your physician.

Cramps in the Legs

Frequently women complain of severe cramps in the legs or instep of the foot. This is probably caused by pressure, although some believe it is due to lack of calcium, just as the rheumatic pains were thought to be due to poor use of calcium (page 122). It might be well to check the calcium content of your diet if you have this difficulty. Standing with your weight on your feet or rubbing the legs usually relieves the pain.

Varicose Veins and Hemorrhoids

Varicose veins are a pressure symptom which may appear during the later months of pregnancy. They usually affect the legs only and, while they are not often serious, they may cause much discomfort. Elevating the legs should relieve the pain. Avoid tight clothing such as round garters. Sometimes it is advisable to bind the legs or wear elastic stockings. Your physician can best determine whether this seems advisable.

Hemorrhoids or piles at the end of the rectum may occur during pregnancy. Cold compresses or lying with the hips elevated may help relieve the pain. Consult your physician for further treatment.

Constipation

Many women are troubled with constipation during pregnancy. This is undoubtedly due to pressure upon the intestines by the enlarged fetus. Constipation can be remedied, at this time as at any other time, by exercise and proper food. Include exercise in your daily schedule. Drink plenty of water and include an abundance of the laxative foods such as fruits, vegetables, and whole-grain cereals in your diet. Buttermilk is more laxative than sweet milk and might be used as part of the milk. It is very important to remedy this difficulty since you must throw off the waste products of the growing baby, in addition to those of your own body. If unable to control constipation through diet and exercise your physician should be consulted.

Expectant mothers frequently complain of gas. This may be due to constipation, eating too many gas-forming foods, such as beans, cabbage, onions, sweets, and fats, or it may be a result of overeating. Including more B_1 or thiamin-rich foods in the diet may be helpful. (For sources of thiamin, see page 60.) If troubled with gas, try to determine and eradicate the cause.

Signs of Labor

During the last few weeks of pregnancy the baby "settles." This means that the head is dropping lower in the pelvis, in preparation of the baby's birth. It is usually obvious that the mother is carrying her baby lower and she will feel greater pressure. Some mothers find it easier to breathe after the baby is lower in the pelvis.

The process by which the baby is separated from the mother's body and brought into this world is called labor. Labor usually begins with contractions of the uterus. The muscles of the uterus have contracted and relaxed since early pregnancy, but these contractions were painless. When nature is ready for the baby to make his appearance into this world the contractions become more distinct until the mother is conscious of them. The pains are usually first felt in the lower part of the back and later in the lower part of the abdomen. At first they are faint and at infrequent intervals; gradually they become more severe and more frequent. Occasionally labor starts with a slight discharge of blood-stained mucus, sometimes called the "show," or the escape of fluid when the membranes or bag of waters break. When the pains occur at regular intervals the doctor should be called.

As a general rule, women have unusually good health during pregnancy. They may have digestive disturbances at the first and tire more easily later, but for most persons their general health is improved. Often the improved health and nutrition are permanent.

REFERENCES

1. H. F. Root and H. K. Root, The basal metabolism during pregnancy and the puerperium, *Arch. Internal Med.,* Vol. 32, page 411 (1923).
2. T. M. Carpenter and J. R. Murlin, The energy metabolism of mother and child just before and just after birth, *Arch. Internal Med.,* Vol. 7, page 184 (1911).
3. H. E. McClenahan, Early diagnosis and care of pregnancy, *Ohio State Med. Jr.,* Vol. 34, pages 991–995 (1938).
4. B. S. Burke, The need for better nutrition during pregnancy and lactation, *Jr. Am. Diet. Assoc.,* Vol. 17, pages 102–111 (February, 1941).
5. M. B. Strauss, Observations on the etiology of the toxemias of pregnancy. Part IV. The primary role of the plasma proteins in conditioning water retention and edema formation in normal and toxemic pregnancy, *Am. Jr. Med. Sci.,* Vol. 195, pages 723–728 (1938).
6. H. M. Teele and B. S. Burke, Diet during pregnancy and nursing period, *Med. Clinics N. America,* Vol. 21, pages 547–561 (1937).
7. K. A. Hoffström, Eine Stoffwechseluntersuchungen wahrend der Schwangershaft, *Skand. Arch. Physiol.,* Vol. 23, page 326 (1910).
8. R. M. Archibald and E. E. I. Hancock, Iron deficiency as the cause of stillbirth, *Can. Jr. Comp. Med.,* Vol. 3, page 134 (1939).
9. White House Conference on Child Health and Protection, Growth and Development of the Child, Part III, *Nutrition,* pages 230–235 (1932).
10. M. L. Hugounenq, Recherches sur la statique des eléments minéraux et particulièrement dur fer chez le foetus humain, *Compt. rend. l'academie sciences Paris,* Vol. 128, page 1054 (1899) also Vol. 130, page 1422 (1900); *Jr. physiol. path. géné.,* Vol. 1, page 703 (1899); Vol. 2, page 509 (1900).
11. W. Camerer and Soldner, Die Chemische Zusammensetzung des Neugeborenen, *Z. Biologie,* Vol. 40, page 529 (1900); Vol. 39, page 173 (1900); Vol. 43, page 1 (1902); Vol. 44, page 61 (1903).

12. W. N. Kemp, Iodine deficiency in relation to the stillbirth problem, *Can. Med. Assoc. Jr.*, Vol. 41, pages 356–361 (1939).

13. N. T. Saxl, *Pediatric Dietetics*, page 88, Lea and Febiger, Philadelphia (1937).

14. H. M. Teel, B. S. Burke, and R. Draper, Vitamin C in human pregnancy and lactation: studies during pregnancy, *Am. Jr. Diseases Children*, Vol. 56, pages 1004–1010 (1938).

15. T. S. Harding, A brief history of rickets therapy, *Med. Jr. and Rec.*, Vol. 129, page 16, January, 1929.

16. G. C. Richardson, Viosterol in pregnancy; review of 300 cases, *Ill. Med. Jr.*, Vol. 65, pages 367–370 (1934).

17. E. Vogt, *München Med. Wrhnschr.*, Vol. 47 (November 22, 1929). Abstracted in *Jr. Obstet. Gynaecol. Brit. Empire*, Vol. 37 (Spring, 1930).

18. J. H. Ebbs and W. J. Moyle, Importance of nutrition in the prenatal clinic, *Jr. Am. Diet. Assoc.*, Vol. 18, pages 12–15 (January, 1942).

19. I. N. Kugelmass and J. E. Tritsch, Prenatal prevention of potential hemorrhagic disease of the new-born, *Jr. Am. Med. Assoc.*, Vol. 92, pages 531–532 (1929).

20. H. S. Carter, P. E. Howe, and H. H. Mason, *Nutrition and Clinical Dietetics*, page 629, Lea and Febiger, Philadelphia (1921). Quoted from *Centralbl. f. Gynecol.*, Vol. 33 (1889).

21. C. C. Weeks, Alcohol and child life, *Rev. intern. enfants*, Vol. 6, page 803 (1929).

22. L. W. Sontag and R. F. Wallace, Effect of cigaret smoking during pregnancy on fetal heart rate, *Am. Jr. Obst. Gynecol.*, Vol. 29, pages 77–83 (1935). Abstract in *Jr. Am. Med. Assoc.*, Vol. 104, page 1275 (1935).

23. A. M. Campbell, Effect of excessive cigaret smoking on maternal health, *Am. Jr. Obst. Gynecol.*, Vol. 31, pages 502–508 (1936). Abstract in *Jr. Am. Med. Assoc.*, Vol. 106, page 1761 (1936).

CHAPTER IV

THE BABY HAS COME

Contents

- *A.* The Baby Tells His Story: He Is the Criterion for Judging Success in Feeding
- *B.* The Baby Eats
- *C.* The Baby Gets Foods Other Than Milk—Water, Orange or Tomato Juice, Cod-Liver Oil, Cereal, Egg Yolk, Zwieback, Toast or Bread Crust, Vegetables, Fruit Sauce, Meat
- *D.* Father Can Help with the Baby
- *E.* Baby Comes to the Family Table

FIG. 1. The baby has come.

WHAT different emotions this announcement brings to its waiting world! The mother is now able to relax and sleep. The father who has probably nervously walked the floor for more or less hours can now smile and proudly say, "I have a son." Relatives and friends, too, are anxious to get a peep at the dear little thing.

When one gets this peep at the newborn baby, he is certainly not beautiful. His head appears "too big for his body" and may be bald or covered with hair, his eyes are closed, and his cheeks may seem sunken. His body is small and his legs are still drawn up in the position in which they were folded in intra-uterine life.

Yet he is a real baby. He is living; he is able to suck; he can cry; he can and does sleep practically 24 hours out of 24. He may have potential possibilities even of becoming president of the United States. Just how happy and how healthy his life will be rests largely with you—his parents.

When he is born, the first treatment he normally receives is a sharp spank by the doctor to start his breathing. He is then oiled, wrapped in a blanket, put in his crib or basket and allowed to sleep, while the mother is being cared for. Then the baby is bathed.

The Baby Tells the Story: He Is the Criterion for Judging Success in Feeding

One of the first and most important considerations of the newborn baby is his food. In feeding a baby, whether with human milk or with any other kind of milk, the baby himself should be regarded as the measure of success of the feeding practice. A mother should learn from the beginning to study her baby. If the feeding is satisfactory, the baby should be alert and happy, sleep well, eat well, cry little, and develop normally both physically and mentally.

Weight As One Guide

One tangible guide for successful feeding is the baby's gain in weight. It is, however, only one factor and should not be considered to the exclusion of other contributing factors. Most parents and some physicians put too much emphasis upon the scales as a means of judging success in infant feeding. It is well for a mother to weigh the baby every week, not daily, until he is one year old and once a month thereafter. The daily weight is misleading, for weight fluctuates considerably from day to day and hence daily weight means nothing. Clothes, food, drink, and elimination affect the weight. If the baby has had a movement just before one weighing and does not have one before the next weighing it may make several ounces' difference in his actual weight. An extra meal or urination will also affect the weight. Therefore, baby should be weighed weekly on the same day of the week, at the same hour, preferably before the bath when clothes have been removed (Fig. 2). One should not be too concerned over stationary weight or even loss in weight for a week or two. Loss in weight should not be persistent, however, if the food is right.

The average weight of a baby at birth is from 7 to 7½ pounds, but many normal newborn babies weigh as little as 5 pounds or as much as 12 pounds.

The average initial loss during the first week of a baby's life is 10 ounces, or about one-tenth of his weight at birth.

By the fourteenth day, his birth weight usually is regained.

At the end of the fifth month, his weight is about doubled.

At the end of the first year, his weight is about trebled.

At the end of the second year, his weight is about quadrupled.

FIG. 2. Baby being weighed.

The average weekly gain during the first 6 months should approximate 4 to 8 ounces; during the remainder of the first year it should be from 2 to 4 ounces.

To check your baby's total gain in weight from birth up to 6 months, figure as follows: From the baby's age in weeks, subtract 2 as allowance for the 2 weeks after birth, which normally show no gain in weight. Divide the remaining number by 2, which gives the maximum gain in pounds from birth. The minimum gain is one-half this amount. To illustrate: A baby of 12 weeks should make a maximum gain of 5 pounds and a minimum gain of 2½ pounds.

A baby who does not gain exactly according to this schedule may still be normal. Experimental work indicates, however, that it is unwise to push a baby's weight beyond a normal average gain. Extra weight does not mean additional progress; for example, an overfat baby is often flabby, colorless, and listless. Weight alone does not give the complete picture of the baby. Many mothers think that if a baby does not cry and is gaining weight there can be nothing wrong with him. Yet, as a mother of seven children once said, "The best baby I had, died when he was 8 months old. He seldom cried. He gained weight regularly; yet I lost him. He was plump but white as a sheet." If a mother will observe her baby carefully, she will note other signs of nutrition that are as important as gain in weight.

Babies, artificially fed today, seem to be growing bigger but not always better.

The literature on rickets shows that Hess found that, the more rapid the growth, the greater the tendency to rickets [1], and Blunt and Cowan state that rickets is one of the greatest dangers associated with overfeeding. [2] Mellanby and other investigators, using dogs and rats as experimental animals, have had the same results. No matter how much calcium, phosphorus, and vitamin D may be given, rickets may result with rapid growth.

But why do babies take so much food if they do not need it? The answer probably lies in the fact that the baby who is not getting enough of certain food elements will undoubtedly take larger quantities of food in an effort to satisfy this deficiency. The result of supplying quantity but not quality is sometimes called "hidden hunger." Artificially fed babies on balanced diets do not overeat but gain weight normally as breast-fed babies do without eczema or rickets.

Other Indications of Successful Feeding

Symptoms other than gain in weight which the mother should observe include height in relation to weight, the baby's skin, bowels, disposition, and physical and mental development, such as sitting, standing, cutting teeth, and walking.

Height

The baby's height should keep pace with his gain in weight. Always judge the baby's length in relation to his weight and age (Table 1). Your baby may not be of average height and weight. Consider his birth weight and length. If he was 18 inches long at birth, do not expect him to be

Table 1. Baby's Height in Relation to Weight and Age

AGE IN MONTHS	AVERAGE WEIGHT IN POUNDS	AVERAGE HEIGHT IN INCHES
Birth	7–7½	20–21
6	14–15	26–27
12	21–22	29–30
24	28–30	32–33

27 inches long at 6 months. Just as a baby tends to double his birth weight by 6 months of age and triple it at a year, so he usually averages 1 inch a month in length the first 6 months, and ½ inch a month the second 6 months of his life.

The Skin

The baby's skin should be elastic, free from eruptions, and pink, with a smooth, creamy background. His mucous membranes should be well colored. If the baby's skin is white rather than creamy or tan and pink, the iron content of his diet may be too low. The skin of the bottle-fed as well as the breast-fed baby should have a rosy tinge. The baby's temperature should be uniform; his skin should be neither hot nor dry.

Elimination

The baby's bowel movements should be regular. They will vary in number, color, odor, and consistency with the food eaten. If on breast milk, cod-liver oil, and orange juice, he may have 1 to 4 movements a day which are yellow, slightly sour smelling, soft and mushlike in consistency. A baby on a cow's-milk formula, with cod-liver oil and orange juice included in his diet, may have only one, more rarely two, slightly foul-smelling, well-formed movements a day. When strained whole cereal is added to either of these diets, the stools will be a brownish color. Prunes will make the stools a darker brown color and spinach will make them slightly green.

Babies should and can have normal bowel movements without the use of any laxative, even the milder ones such as milk of magnesia and mineral oil. A study of about 1000 babies, fed according to directions from the New York State College of Home Economics, has demonstrated this truth. Many of these children have reached school age and have not had a laxative of any kind.

The baby should pass a normal amount of urine daily. This may be only 2 to 3 ounces a day at birth, but it increases to about 8 to 16 ounces, or ½ to 1 pint a day at 6 months of age. The urine when first voided should be free from odor except in the early morning.

Disposition

The baby should be happy and alert. He should not be easily disturbed by his surroundings. He should cry little. However, if one judges disposition by crying alone, it may be a misleading criterion. The undernourished child may not have enough energy to complain of his condition. The overweight baby may be inactive and cry little.

Most mothers think that when baby cries he is hungry. Well babies may cry because they are hungry, but there are many other reasons for crying. Baby may cry because he is too full; because of indigestion or colic; because he is wet; because he is too hot or too cold; because a pin pricks him; because he is thirsty; and, if given too much attention at irregular times, he may cry just to get attention.

Mothers may think that if a baby cries and sucks his thumb or fingers he is certainly hungry. Many babies, however, have been known to suck their thumbs or fingers when their stomachs were full.

The question has often been asked, How much should a baby be allowed to cry? Crying will be negligible in a healthy baby after mother and baby have set satisfactory intervals of feeding, the family has planned for fairly regular hours of feeding, exercise, play, sleep and sunbath, so that baby knows when he can expect adult attention. In fact, one mother, after having her first baby home from the hospital for 3 weeks, called to ask if we thought something could be wrong because the baby never cried. That same baby, now a fine-looking eight-year-old girl, still cries very little because she is well and in a happy, well-organized home.

When well babies, well cared for, cry, there is a reason, and some one should find out what it is. Crying is hard and unnecessary work. As Benedict and Talbot have shown, strenuous crying and kicking may increase the energy metabolism of a baby 65 to 200 per cent. It has been estimated that if a baby cries 24 hours, he expends enough energy to lift his own body to the top of the Washington monument.

Therefore, it is better to shorten the feeding intervals than to let a baby cry 15 or 20 minutes before each feeding. For if he does this regularly he will need more food to supply this extra energy. Parents should remember that crying is baby's only way of saying, "I am too hot," "I am too cold," "I am uncomfortable," or "Please give me something to eat." As baby reaches a year of age and learns words, it is very easy to change crying to words. One of the authors has enjoyed helping 3 or 4 toddlers in her own home, and many others outside it go through this stage. When the child cries and points or grabs at something, if the adult or older child happily says, "Say please," and refuses to respond to his cry, baby will soon learn by approval to say "pease" happily.

Sleep

A well baby sleeps quietly; at birth 20 to 22 hours a day, then gradually less, until at 1 year of age he sleeps 15 to 18 hours a day.

Development

The baby's bodily development other than gain in weight is an important criterion for judging success in feeding. The first change noted is probably the shape of the head. The heads of newborn babies sometimes appear queerly shaped, as a result of the process of being born. They should, however, assume a good shape in a short time. The soft spot, or fontanelle, on the back of a baby's head should be closed at 2 months. The fontanelle on the top of his head will not normally close until the baby is about 1½ years old.

The baby's chest should develop and broaden (see Table 2) and his ribs should recede early in life, giving a straight line down the sides, with only a slightly protruding abdomen. The abdomen should not be tender to the touch.

Table 2. Average Weight, Height, and Circumference of Head and Chest of Healthy Children from Birth to Four Years

AGE	SEX	WEIGHT	HEIGHT	CHEST	HEAD
		pounds	*inches*	*inches*	*inches*
Birth	Boys	7.55	20.6	13.4	13.9
	Girls	7.16	20.5	13.0	13.5
6 months	Boys	16.0	26.5	16.5	17.0
	Girls	15.5	26.0	16.1	16.6
12 months	Boys	21.0	29.5	18.0	18.0
	Girls	20.5	29.0	17.5	17.5
18 months	Boys	24.5	31.5	18.7	18.6
	Girls	23.7	31.0	18.2	18.0
2 years	Boys	27.0	33.5	19.3	19.2
	Girls	26.0	33.0	18.8	18.6
2½ years	Boys	29.7	35.5	19.8	19.5
	Girls	28.7	35.0	19.3	19.0
3 years	Boys	32.0	37.0	20.3	19.8
	Girls	31.0	36.5	19.8	19.4
4 years	Boys	36.8	40.5	20.8	20.0
	Girls	35.3	40.0	20.3	19.7

From *Diseases of Infancy and Childhood* by L. E. Holt, page 23 (1922). Courtesy of Appleton Publishing Co.

The baby should cut his first tooth between 6 and 9 months of age. He usually cuts, as an average, 1 tooth a month up to 18 months. After that they come more slowly. Therefore, he should have, at about

12 months, approximately 6 teeth.
18 months, approximately 12 teeth.
24 months, approximately 16 teeth.
30 months, approximately 20 teeth—his total set of so-called baby, milk, or deciduous teeth.

The teeth should come through without upsetting the baby.

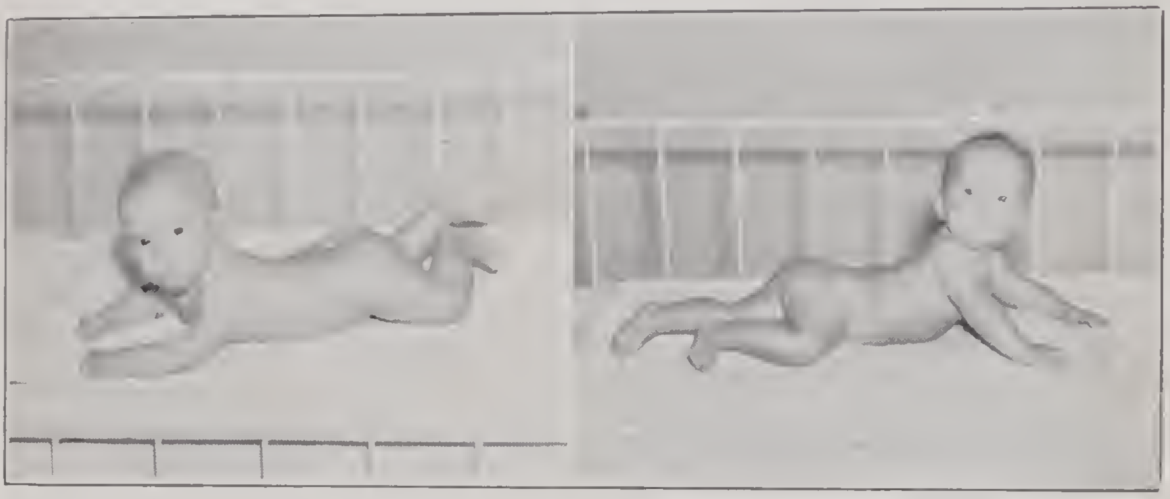


FIG. 3. Well-developed twins, Mary Alice and Rose Ann at five months of age.

In general, a healthy infant doubles his weight in 5 or 6 months, trebles it in 1 year, and quadruples it in 2 years. He is able to follow a light with his eyes at 6 or 7 weeks; to recognize objects at 6 or 8 weeks; to reach for things at 4 or 5 months; and to hold his head erect at 4 months. He sits erect and has his first tooth at about 6 or 7 months; creeps at 7 or 8 months; stands with assistance at 9 or 10 months; attempts to walk and to speak single words at 12 or 13 months; walks at 14 or 15 months; and speaks in short sentences in his second year.

The baby should eat well, have a good appetite, and be satisfied with food given at 2-, 3-, or 4-hour intervals. He should be able to take and to digest his food without regurgitating or spitting it up. He should breathe quietly and have good circulation. (See well-developed babies, Fig. 3.)

It is unusual for two babies to show the same development at exactly the same age. A mother should not be concerned if her baby does not gain weight, sit up, cut a tooth, creep, walk, or talk as early as her friend's baby. There is a range in age for the normal time for all these signs of development to appear. Do not try to force your baby to sit or walk. When he is ready he will accomplish this by himself. If your child does not have what seems to be an all-round development, find the reason and do something about it. The child's diet and daily regimen will be discussed later. Study them and if you cannot locate the difficulty consult a physician.

The Baby Eats

The Baby Rests before Feeding

How long the newborn baby and mother are allowed to rest after baby's first bath and before baby is put to the breast has for some time been a matter of controversy. Accordingly, Oeljen and Scherer studied two similar groups of infants, 200 in each group, letting one group rest 12 to 24 hours (an average of 14 hours) and the other 24 to 36 hours (an average of 27 hours) before putting them to the breast the first time. They found that with the longer period of rest:

1. The initial loss of weight was less.
2. A number of infants vomited amniotic fluid for 24 hours; they had a tendency to continue vomiting if put to the breast early.
3. Minor birth injuries were benefited.
4. All nurses on the service agreed that the first application to the breast was much easier after the delay.
5. The mother received a full day of rest.
6. There seemed to be less breast milk at first, but the deficiency was soon made up (after 3 days) and the infants took considerably more than the infants of the other group before the end of their stay in the hospital.
7. A larger percentage of the babies had regained birth weight when discharged from the hospital. [3]

Hence it seems advisable from the standpoint of both mother and baby to allow the longer rest period before baby nurses.

Mother's Milk—Baby's Best Food

Mother's milk is nature's food for the baby. It is adapted to the human baby and differs from the milk of a cow, a goat, or other animals. Those who have watched a newborn calf stand upon its feet at birth and have waited 10 or 12 months for the same result in a baby must realize the difference in species. Aside from the fact that the calf is more active at birth, hence requires more calories, it also grows more rapidly, meaning that it develops muscle and bone faster than the human baby.

Mother's milk is better suited to the human baby than any known form of artificial food. Comparison with cow's milk demonstrates this clearly (see page 169). Cow's milk, since it is primarily intended for the rapidly growing, active calf, contains about 3 times as much protein, almost 4 times as much calcium, and about 6 times as much phosphorus as does mother's milk. The protein of cow's milk forms a heavy curd in the stomach, and that of mother's milk, having less casein and more lact-albumin, forms a finely divided, flocculent mass which is easily digested by the human baby. There is 5 times as much casein, the part of the milk used to make cheese, in cow's milk as in human milk. The fat of the human milk is in a fine emulsion and contains few volatile fatty acids. The minerals are suited to the human baby, and the vitamins can be regulated largely through the diet of the mother.

Advantages of Breast Milk to Baby

Breast milk offers many advantages to the baby. Milk flow is preceded by colostrum, which is reputed to contain antibodies that give the baby some protection from infection. The composition of mother's milk is better suited to meet the baby's needs and is more easily digested than the milk of other mammals. Since it goes directly from mother to baby, it is more likely to be sterile. The milk of any other animal may become contaminated with bacteria, causing dysentery, diarrhea, and other difficulties. This is particularly true in summer, when temperature is ideal for bacterial growth, and probably accounts for much of the difficulty so long associated with babies' "second summer." With the better handling and pasteurization of cow's milk there is less difficulty than formerly, but it is still true that infant mortality (death) and morbidity (illness) are higher in bottle-fed than in breast-fed babies. New Zealand had about the highest reported infant mortality before breast feeding was the rule, and since breast feeding has been used extensively in that country it has had the lowest infant death rate.

Grulee, who studied the advantages of breast feeding in Chicago, gives information concerning the morbidity and mortality of a group of 20,061 infants, of which 9749 or 48.5 per cent were entirely breast fed. The mortality among those fed exclusively from the breast was 1.1 babies per thousand, in the partially breast-fed it was 5 times as high, and in those artificially nourished it was 10 times as great. [4] The morbidity rate was also decidedly less for the breast-fed babies.

The League of Nations also brought out the fact that there is less digestive disturbance with breast-fed babies and advocated a campaign for breast feeding.

The fact that breast milk is the preferred food for premature babies, twins, triplets, or any multiple birth shows that doctors consider it to be baby's best food.

According to Dr. Dafoe, the quintuplets had breast milk as their entire source of milk until they were nearly 4 months old. Since these babies were tiny, however, and could not get enough from their own mother, they were given the milk of other mothers. They were fed from a medicine dropper at first, and from 6 days to 2 months of age from a Breck feeder. At 2 months they were taking all their food from an ordinary feeding bottle. [5]

Studies show that breast-fed babies have less indigestion, less respiratory diseases, less rickets, and a lower mortality rate than bottle-fed babies. This should be sufficient encouragement for mothers to put forth every possible effort to give their babies the best.

Advantages to the Mother

Breast feeding also has advantages for the mother. It influences the normal contraction of the uterus. It helps normal recovery of the organs of reproduction. [6] Breast feeding is cheaper and is also more convenient than bottle feeding since the mother does not have to worry about making the formula, washing and sterilizing bottles and nipples, refrigeration, and reheating the formula.

Can All Mothers Nurse Their Babies?

Experiments show that most mothers could nurse their babies if they wanted to. For example, at one clinic in Paris it was found that 99 per cent of the women were able to nurse their babies. Also, Martin reported that in Württemberg, where only 41 per cent of the women in clinics had been nursing their babies, 100 per cent were capable. [7]

Others report similar results. When mothers really want to nurse their babies, a high proportion is successful.

The human-dairy success certainly seems to show the possibility of increasing milk flow. One New York City bureau collected 4040 quarts of human milk in 1937 in an effort to decrease mortality in premature babies. Dr. Macy, of Detroit, reports the case of one woman whose average daily output was nearly 3½ quarts of breast milk a day. [8] It is usual to allow 2½ ounces of breast milk per pound of baby per day in the first half year. Accordingly, this amount of milk would feed approximately 44 pounds of baby, or four 11-pound babies, or all the Dionne's up to the time they weighed almost 9 pounds each.

Margaret Mead reports that of three New Guinea tribes—one calm, one probably medium, and one headhunter—all nursed their babies and, if the mother died, a grandmother or even a maiden aunt might nurse the baby. [9] Missionaries say that this practice is common in parts of China, India, and other countries as well.

If in other less fortunate countries all the women nurse their babies, why is this not true in America? Perhaps one trouble is that in many hospitals babies are put on a 4-hour schedule and, to keep them satisfied, are given enough milk from a bottle to meet their needs more than completely. The result is less vigorous nursing at the next feeding and less breast stimulation for the mother. The first days at home the mother may worry so that during this period of adjustment she may find herself with little or no breast milk and a cross baby. If he is given a formula or large supplementary feeding, the breast milk may vanish completely. One difference between the feeding practice in New Guinea and in America is the interval between feedings. Babies vary in the amount of food they can take and digest at a feeding. If a baby and mother decide the interval according to the baby (his size, his ability to handle food, the amount he sleeps or cries) and to the mother (especially her ability to produce milk), perhaps we would have more success with breast feeding.

FIG. 4. Ann, who determined her own interval of feeding, had the advantage of her mother's milk for seven months.

Many mothers who thought that they could not nurse their babies have succeeded in completely nursing them by letting baby and mother set the interval of feeding. This is accomplished, with the very young baby, by giving him breast milk with nothing in addition except boiled water from a bottle.

Ann's mother, who had just returned from the hospital, wrote to ask how she could increase her milk supply. The mother was advised to nurse the baby whenever she cried and seemed hungry; to have the baby completely empty one breast; if she was not satisfied, to offer the second breast and let her take as much as she wanted; to alternate the breast she started with each time; and to keep account of the intervals between feedings. After 3 or 4 days of this schedule the mother should be able to find the schedule which is best for the baby and mother. As the baby nurses, the breast becomes stimulated to greater flow by the complete frequent emptying, the mother ceases to worry as the baby gains, so that in a short time the baby is contented for a longer interval.

This particular mother wrote back in a short time to say that she was completely nursing her baby and that the baby was satisfied on a 4-hour schedule. She was the first mother whom we advised to try to adjust the feeding interval to suit the baby and mother. Figure 4 shows the baby.

Why Mothers Do Not Nurse Their Babies

Why are mothers weaning their babies from the breast so early? A study of 1000 infants reveals some of the reasons given by mothers. [10]

Analysis of 1000 cases of infant feeding (cases taken from middle-class Americans):

Babies, Percentage	*Length of Time Nursed*
40	8 months or longer
23	4–8 months
37	3 months or less (14 per cent not at all)

Reasons given for weaning 337 of the 371 babies weaned the first 3 months:

Cause for Weaning	*Cases*
Insufficient or poor milk	165
Illness or weakness of mother	57
Bad stools of the infant	26
Illness or weakness of baby	23
Nervousness of mother	10
Other reasons, including mother working, mother refused to nurse child, child would not nurse, pregnancy and death of mother	56
	337

Insufficient milk should not be reason for weaning. If baby is put to both breasts each feeding and at relatively short intervals, the flow of breast milk may be increased as other races have demonstrated. Bad stools may often be simply "hunger stools" which can be overcome by the increased flow of breast milk. Hunger stools are brownish or greenish-brown in color, soft, containing little fecal matter and much mucus. They are small and numerous.

It would seem that illness or weakness of the baby should be reason for giving as much breast milk as possible rather than for weaning. Breast milk can be extracted and given to baby from a bottle if necessary.

Illness of the mother and pregnancy would have to be left to the doctor to decide, though according to many physicians another pregnancy is not sufficient reason for weaning if both mother and baby at breast are well and both are getting sufficient food.

Factors Affecting Successful Breast Feeding

Factors Other Than Diet

Many factors contribute to the decision of whether or not a mother will be successful in nursing her baby. Some of these factors are the mother's desire to nurse her baby, calmness of the mother, health and happiness of the mother, normality and functioning of mammary glands, frequency of nursing, alternating the breasts as well as emptying one at each feeding, and the mother's diet. The infant should be hungry, have strength and energy to nurse vigorously. There may be other influencing factors which are unknown at present. Whether inheritance is a factor we are unable to say.

The first prerequisite is for the mother to want to nurse her baby.

In nursing her baby the mother should be calm, should relax, and should, for the time being, forget the rest of the world. She may find it an advantage to rest, reclining or sitting in an easy chair with a good novel or magazine before each nursing.

She should hold her baby comfortably while nursing him and give him assurance of security by her manner of holding him, her looks, and her voice (Fig. 5). Some mothers find it advisable to express a little milk before the baby starts to nurse, to insure opening all the holes in the nipple.

As early as 1550, Oestorreicher said that there were three ways of lightening the pangs of infancy: to give the breast, to handle baby gently, and to use a pleasant modulation of the voice.

Notice the difference between a group of cows in front of your car and a group of women. It may seem discouraging to you to drive behind cows, but if they were as nervous as women, we should probably have a milk shortage. A nervous mother is less likely to secrete as much milk as a calm mother. Babies also react to this nervousness in mother or other close attendant to such an extent that it may interfere with their well-being.

The mother should avoid excitement, worry, nervousness, and overwork. It is not unusual to have a nursing mother call to ask what is wrong with her baby, and when you stop to analyze the situation you find that something unusual has happened. Perhaps she canned 50 quarts of string beans that day, and to cap the climax her husband had a special guest for dinner. Although some women can do these extras with ease, it may be quite a nervous strain for others. A nursing mother should realize her limitations, and her husband and family should make it their business to help maintain an atmosphere of calm deliberateness for her. According to Hess, the secretion of milk may be affected so as to lessen the flow for a day or two by such factors as anger, fright, worry, shock, distress, sorrow, or the witnessing of an accident. [11] It may be necessary for a few days, therefore, to feed baby oftener or to give supplementary feedings. Menstruation may also cause lessening of quantity of milk and necessitate a similar treatment. If the mother wants to continue nursing her baby, feeding him oftener until increased milk flow is again established may be better than giving a supplementary feeding.

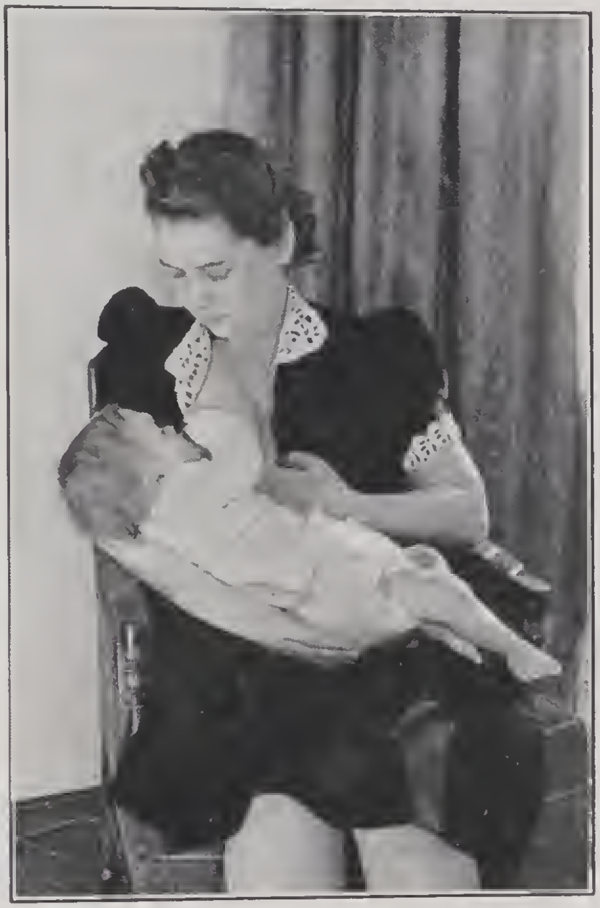


FIG. 5. Janet enjoys her mother's milk.

When Margaret Mead was asked which breast-feeding practices in New Guinea she thought could carry over to us in America, she suggested:

1. Women should nurse their babies every 20 minutes at first.
2. Women should relax in handling babies and children. Tense holding is bad for any child.

It is possible also that smaller babies need to be nursed frequently (the quintuplets were). On the face of it, would it not seem perfectly absurd to feed little Marie Dionne, the smallest quintuplet, who weighed 1½ pounds at birth, on the same intervals of feeding as a newborn baby of our acquaintance who weighed 12 pounds? There are many babies whose weights come between these extremes. Their sizes are different, their stomachs are different, and their mothers secrete different amounts of milk. Why not let the baby decide the feeding interval according to that baby and that mother?

Completely emptying at least one breast at each feeding is important. Occasionally babies are not strong enough to empty the breast completely, especially when young. In such cases the mother's milk often tends to decrease. It is possible to increase the milk supply by completely emptying the breast by hand after each nursing. (For detailed directions for expressing breast milk, see *Feeding and the Nutritional Disorders in Infancy and Childhood*, by J. H. Hess.) The mother should alternate the breasts used first by the baby at each feeding. If the baby is not satisfied or not gaining satisfactorily, he should be offered a part or all of the second breast.

In order successfully to breast-feed her baby the mother should lead a normal, healthy, and happy life. In addition to proper food her daily routine should include exercise, fresh air, sufficient sleep, and good elimination.

The Daily Diet of the Nursing Mother

The diet of the nursing mother, like that of the expectant mother, is important not only in producing a healthy child and in protecting her own health, but in determining her ability to nurse her baby. To illustrate this point a study of 657 babies of full-term birth showed:

1. That 12 per cent were never breast fed; 43 per cent were breast fed for less than 4 months.
2. That 43 per cent of the mothers whose babies were weaned before the end of the fourth month gave insufficient milk as the reason for weaning the baby.
3. That, of the mothers who gave "insufficient milk" as the reason for weaning their babies early, 15 per cent used no milk during pregnancy and 20 per cent used no milk during lactation.
4. That, of the 79 mothers who never breast fed their babies, 91 per cent, or 72 mothers, used no milk in their own diets during the lactation period. [12]

The foods included in the diet for the nursing mother should be to all intents and purposes the same as those for the expectant mother. For each, the objective is to supply to both mother and child all the nutrients needed by each for normal health and growth. Therefore the diet for the expectant mother, described on pages 124 to 128, should be followed by the nursing mother. She may find, however, that she needs and wants an increased amount of food, which should be an increase in all food substances. (See Appendix, page 355.)

Calories

Every ounce of milk a woman secretes represents 20 calories of energy; a baby needs 2½ ounces of mother's milk for every pound of baby weight each day during the first half year of his life. That would amount to 30 ounces of milk for a three-month-old, 12-pound baby, or 600 additional calories represented by milk alone. An older baby, weighing more, will require increased amounts of milk, which means more calories will be needed by his mother. It is probable that additional energy is needed for the work involved in converting food into milk. Some authorities believe that this may amount to a 10 per cent increase in the energy needs of the nursing mother, which would be 22 calories per ounce of milk. Hence the calories needed by the mother will depend upon the weight of her baby or the amount of milk needed to feed that baby. If sufficient food is not supplied, lactation may proceed at the expense of the mother's body. The National Research Council allowance in January, 1943, recommended approximately a 500-calorie increase during lactation for a woman getting 2500 calories in pregnancy.

Allowing 22 calories to produce an ounce of milk, the 500 calories would produce 23 ounces of mother's milk. This amount would feed about 9 pounds of baby, allowing 2½ ounces of mother's milk per pound of baby. The mother should eat enough to satisfy her but not sufficient to give her a "stuffed feeling."

Protein

Several observers, including Eckles and Palmer, working with dairy cows, and Maynard and associates, working with rats, have seemed to show that high protein intake is desirable in lactation. Macy and coworkers report that high protein as well as high calories were consumed by their human subjects. She reports three cases: one of a woman taking 4300 calories with 160 grams or 640 calories of protein, one of a woman taking 4600 calories with 165 grams or 660 calories of protein, and one of a woman taking 3800 calories with 150 grams or 600 calories of protein. [13] The National Research Council's allowance is 3000 calories with 100 grams or 400 calories of protein. It has been estimated that the protein calories of the diet should normally be between 10 and 15 per cent of the total. In none of these cases does it come above 15 per cent.

Research with rats brings out the fact that the kind of protein is an important factor in determining the success of lactation. When rats were given a diet including 18 per cent casein, the requirements for lactation were not met, but an additional 0.2 per cent of cystine caused decided improvement. [14] The protein should come mostly from foods containing a large amount of the essential amino acids—milk, eggs, meat, fish, and cheese. Since the only food which has been found to stimulate breast flow in animals is high protein, the mother should include a quart of milk, a serving of meat or fish, and an egg in some form each day.

Other Food Essentials

In the nursing mother's diet, according to the National Research Council, January, 1943 (see page 355), minerals and vitamins, with the exception of iron, should also be increased above the pregnancy allowance. In view of the fact that anemia is common among lactating women, the authors believe that additional iron may also be beneficial. If consumption of nutritious food is increased, the amount of iron would be increased. A mother on the diet recommended for pregnancy will need to increase her food intake of that diet in order to increase her calorie, protein, vitamin, and mineral consumption. Table 3 shows how food meets the allowance recommended by the National Research Council for the lactating period. The one exception might be vitamin D. Liver once a week, a serving of fat fish several times a week, and an hour in the sunshine daily would probably meet the need for vitamin D. However, a teaspoon of fish-liver oil or its equivalent (see page 184) would be a sure way of securing vitamin D, especially in winter.

Effect of Food on Changes in Mother's Milk

There seems to be definite evidence that iodine and some vitamins can be increased in the mother's milk by increasing them in food. There apparently is no research to prove that overeating increases the milk output.

In 1923, Carter, Howe, and Mason report that if mother's milk is too rich, which usually means high fat and protein content, the mother's diet should be decreased (especially the meat, eggs, and milk) and the amount of water which she takes and her exercise should be increased to reduce the fat content of the milk. [15]

Experiments have been performed, mostly on animals, to determine what factors cause increase in the fat content of milk. To date we feel that evidence is not conclusive.

Some experimental work seems to show that a large amount of fat in the diet increases the percentage of fat in the milk. [16, 17] Some have found that proteins, especially those rich in sulfur-containing amino acids (cystine), increase the fat. [18] Then others seem to have found a decrease in concentration of fat with a reduction of food protein. Another

Table 3. Foods To Meet the Daily Needs during Lactation

Food	Amount	Calories	Protein	Minerals		Vitamins			
				Calcium	Iron	A	Thiamin	C	Riboflavin
			grams	*grams*	*grams*	*I.U.*	*micrograms*	*milligrams*	*micrograms*
Milk	4 cups	680	32	1.150	0.00196	1,072	584	8	2,196
Tomatoes, 1 serving	2 small	42	2	0.020	0.00080	2,200	156	46	120
Peaches	2 medium	102	2	0.022	0.00066	2,000	60	20	120
Potatoes, 1 serving	1 medium	100	3	0.014	0.00108	36	144	16	54
Turnip greens	¾ cup	52	3	0.521	0.00525	15,000	130	225	540
Beans, lima (dried)	⅓ cup	200	10	0.049	0.00482	56	304	0	504
Egg	1	80	7	0.031	0.00155	500	75	0	165
Salmon, fresh	6″ × 3″ × 1¾″	305	23	0.015	0.00135	750	171	...	.....
Oatmeal, 1 serving	¾ cup	150	6	0.016	0.00120	.....	135	0	26
Bread, whole-wheat	6 slices	450	18	0.120	0.00288	.....	504	0	150
Butter	6 tbsp	600	0	0.012	0.00018	1,872	.....	...	.....
Bacon	3 slices	100	3	0.002	0.00049	3	23	0	.....
Ice cream	½ cup	100	2	0.082	0.00020	268	146	2	549
Brown sugar syrup	3 tbsp	100	0	0.023	0.00068	0	.....	0	.....
Total		3,061	111	2.068	0.02310	23,757	2,432	317	4,424
Allowance National Research Council		3,000	100	2.000	0.015	8,000	2,300	150	3,000

These foods provide some vitamin D. It is assumed that the mother will be outdoors some time daily and get sunshine and skyshine when possible.

authority associates the fat content of the milk with the phosphorus content of the diet. [19] These experiments have not been sufficiently verified to make them of practical value. The eight or nine women we have observed who apparently produced high fat were on excellent diets. Perhaps some women normally have a higher fat content throughout the lactation period than others.

Frequently uninstructed mothers and grandmothers give lists of foods which should be excluded from the nursing mother's diet. Such information should be discounted. Any food that does not affect the mother unfavorably is not likely to affect her baby unfavorably. On the other hand, depriving herself of some foods may result not only in discomfort to the mother but may be detrimental to the baby as well.

Practically every healthy mother would give her newborn baby the protection which mother's milk affords if she understood its importance. To do so she should follow these simple rules:

1. Want to nurse her baby.
2. Live as calm and happy a life as possible; be able to pursue her regular duties without excessive excitement, worry, and nervousness; if the baby has an understanding father, that helps a lot.
3. Have daily exercise and sunshine, 8 hours of sleep each night, and good elimination each day.
4. Have the interval between nursing suitable for that baby and mother; to determine this interval: feed the baby when he is hungry; put him down to sleep between feedings, being sure that he is comfortable and in fairly quiet surroundings; he will sleep most of the time, and will probably waken for feedings at 2-, 3-, or 4-hour intervals; this can be used as a guide in determining the future feeding schedule.
5. Alternate breasts used first by the baby at each feeding.
6. Completely empty at least one breast at each feeding; as long as you can hear the baby swallow, he is getting milk; when he sucks without swallowing, you should see if the breast is dry; a few drops can be expressed from the breast even if it is dry; if a steady stream or spurt can be expressed, there is still milk available; offer the second breast if necessary.
7. If the milk disappears it may often be made to return by shortening the intervals between nursings.
8. Have a well-balanced diet.

The Baby Is Nursed

Difference between Colostrum and True Milk

Colostrum is the deep lemon-yellow substance secreted by the mother's breast the first few days of lactation. Mothers frequently ask what the difference is between colostrum and true milk and how long a baby usually gets colostrum. It contains less fat and more protein and ash than does true milk and it coagulates with heat.

Holt, Courtney, and Fales show, by the following table, the changes that take place as the lactating period progresses. [20]

Table 4. Percentage Composition of Woman's Milk by Periods *

Period	Fat	Sugar	Protein	Ash
	percentage	*percentage*	*percentage*	*percentage*
Colostrum 1–12 days	2.83	7.59	2.25	0.3077
Transition 12–30 days	4.37	7.71	1.56	0.2407
Mature 1– 9 months	3.26	7.50	1.15	0.2062
Late 10–20 months	3.16	7.47	1.07	0.1978

* *Am. Jr. Diseases Children*, 1915. Courtesy of Am. Med. Assoc.

Some authorities think, however, that only the first 3 or 4 days after the baby's birth is there true colostrum and that later than that it is mixed with milk. It is true, however, that the colostrum stage varies in length with different individuals, and with some women 12 to 14 days may elapse before true milk comes in.

Amount of Milk Needed by the Breast-Fed Baby

A well-nourished breast-fed baby gets 2½ ounces of mother's milk per pound of baby weight per day for his first half year and 2 ounces per pound the last half of the year. A mother can determine fairly accurately whether baby is getting enough breast milk by weighing the baby before and after each feeding for a 24-hour period. There is much variation in the amount of milk secreted at different nursings; consequently the amount received from a single nursing would be of no value. Weigh the baby in the same clothes. Do not change them even if he wets or soils a diaper during that feeding. Write down the increase in weight at each feeding. Adding the amounts gained at each feeding and dividing by the baby's weight should give 2½ ounces for a baby less than 6 months of age and 2 ounces for an older baby.

Thus, a three-month-old baby, weighing 12 pounds, gets at

6 A.M.— 8 ounces of mother's milk
10 A.M.— 6 " " " "
2 P.M.— 3 " " " "
6 P.M.— 4 " " " "
10 P.M.— 4 " " " "
Total 25 " " " "

Dividing 25 (the total ounces of breast milk baby gets that day) by 12 (baby's weight in pounds) shows that this baby averages only a little better than 2 ounces of mother's milk per pound of baby weight per day. Or the mother could divide 25 by 2½ (the amount of mother's milk a three-month baby should get) and the mother would thus find that she is feeding only 10 pounds of her 12-pound baby.

Water for the Breast-Fed Baby

Boiled warm water from a bottle should be offered the breast-fed baby several times a day between feedings. If the breast milk is sufficient, the baby may not be interested in taking water except on hot, dry days or after exercise. The mother need not be concerned about this, for the liquid in breast milk may meet the baby's demand for fluid without additional liquid. However, baby is unable to go to the faucet and help himself, and therefore water should be offered daily so that he can have it when he wants it. Heat, exercise, and dry atmosphere increase perspiration, and more water may be taken by baby. If the baby takes water very freely, it may be an indication of too little breast milk; the baby's gain in weight should be carefully noted.

Length of Nursing Period

Mothers have often asked how long a baby should nurse at one breast. The answer can only be that it will depend upon the baby, his ability to nurse, and the mother's ability to supply milk. Babies have been known to empty a breast completely in 3 or 4 minutes; many babies, on the other hand, take longer. If, however, the baby is willing to stay at a breast longer than 20 minutes, the interval between nursings may have to be shortened. This would be particularly true if baby were not sleeping through to the next nursing period or were not gaining regularly.

Baby's stomach is too small to act as a reservoir and is more tube shaped and more upright than that of an adult or older child. Therefore food comes up easily. For this reason baby should not be overfed and he should be put over the shoulder or knees after feeding and patted gently to help him expel any gas or air swallowed. Then he should be put down to lie quietly. There has been much discussion as to whether a baby should be put upon his back, stomach, or side to sleep. It may be well, following feeding, to put baby on his stomach. Lying on the stomach helps him to raise any air he may have swallowed. A firm mattress and no pillow should be used for the baby so that there will be no danger of suffocation. As baby develops and learns to turn over he will decide this issue for himself.

Fortunately for the mother who breast-feeds her baby, few difficult situations are likely to arise, the mother's milk may be too rich and therefore upset the baby or the mother may not have a sufficient amount of milk to satisfy her baby.

When Mother's Milk Is Too Rich

Symptoms of too-rich breast milk are rapid gain in baby's weight, associated with much gas, indigestion, and often constipation. The baby usually cries a good deal and may refuse his food.

The following are excerpts of a letter from a mother who was giving her baby too-rich breast milk:

> What can I do for constipation in my eight-week-old breast-fed baby? All the books, pamphlets, and things tell about bottle-fed babies. Evidently breast-fed babies are not expected to have that trouble, but mine does. He hasn't had a normal bowel movement in two weeks. . . . I don't like to keep doping baby all the time. There must be a better way. I've been told that if I'll give him a dose of castoria every night I won't have any more trouble. Years ago I had that trouble myself. Then it was a dose of syrup of figs every night until I took to eating more fruit and vegetables, drinking more water and climbing the hills about home. But baby can't eat fruit and vegetables or climb hills. He does drink about 4 ounces of water each day. . . .
>
> Baby has gained from 8 to 10 ounces a week in spite of constipation, almost continuous crying and gas. His birth weight was 6 pounds. He did not lose during the first week even.

A later letter reported that by the end of his thirteenth week he had doubled his birth weight.

This mother was probably what might be called a Jersey or Guernsey mother. She apparently produced too much fat in her milk, which caused the baby to gain abnormally fast, with indigestion and constipation as here described. The stool, in such cases, is usually white or grayish white, hard and dry (fat-soap stools) resembling the stools of a dog which has been eating bone.

To remedy this condition the mother should not let the baby have the stripping (the last) of the breast feeding which contains most of the cream. The baby may be offered both breasts at a single feeding. If it normally takes baby 15 minutes to empty breast, give him each breast but 8 minutes. The mother should empty one breast each time by manual manipulation. Also this baby, as described in the letter, can at 8 weeks (2 months of age) eat *his* fruits and vegetables, such as orange juice, prune juice, apricot juice, vegetable waters (that is, water in which any mild-flavored vegetable has been cooked), and can climb *his* hills. (For exercise, see page 193.)

Vegetables and fruits, started as early as this, in the form of fruit juices or vegetable waters, should be strained, and 1 to 3 teaspoons may be given at first from a teaspoon or, in sterile water, from a bottle. The amount should be increased gradually to see how much baby can take and needs to help his condition. It should be increased only gradually, however, and baby's bowels should be watched during the process. Diarrhea, the opposite of constipation, may result from too much fruit juice or vegetable water and is worse for baby than constipation.

In many cases this rich breast-milk condition seems to correct itself. Often the infant refuses the strippings. A mother should not let this worry her unless it continues at every feeding and the milk flow thereby becomes decidedly lessened. The mother by manual manipulation or the use of a breast pump should empty one breast each feeding time to stimulate more milk flow or should put baby to breast at shorter intervals. On the other hand, frequently either the breast milk changes in composition or the baby's digestive power increases so that he is able to take the milk without further difficulty. However, if the condition is not corrected, baby may develop an eczema and, later, diarrhea.

Many mothers have brought babies of this type for examination and counsel. Usually not letting baby get the strippings and giving him water before feedings is sufficient to correct this condition. Occasionally the interval of feeding also needs to be shortened, so that baby gets enough food, when not allowed the strippings. When the baby is 3 months or older, using boiled skim milk on his cereal is of considerable help. A mother must remember, however, that when she gives breast milk without strippings and skimmed cow's milk on cereal, baby is being deprived of vitamin A as well as of fat. Therefore, if at 3 months of age the baby is already getting daily ⅓ teaspoon of cod-liver oil or its equivalent in vitamin A, it will take care of this deficiency. Some products supply vitamin D but not vitamin A. The mother should not expect these or sunshine to furnish the vitamin A needed by her baby.

Recently, there have been eight such "Jersey" mothers brought to our attention. All these mothers had been on unusually good diets, high in protein, during pregnancy and lactation. Their milk seemed so rich that even though their babies often refused the last of it there appeared to be little one could do to change it. When the babies were weighed before and after feeding it was learned that the babies did not get an excess of milk but gained very fast.

A search through the literature to find what causes increased fat in breast milk brought to light very little. (See page 157.) The statement has been made that the milk of some individuals normally has a high fat content.

Insufficient Breast Milk

There is, on the other hand, the breast-fed baby who consistently fails to gain weight over a period of weeks. His sleep is disturbed. He is restless and cries before feeding. He may show that his needs are not being met by nursing greedily a short time and then crying or he may demonstrate the inadequacy of his food supply by clinging quietly a long time to the breast where he may even go to sleep. If his mother feeds him oftener, no doubt she will stimulate more milk flow and get better results. If baby's gain in weight is less than normal, the baby may need to be fed both breasts at each feeding and fed at more frequent intervals than the average schedule requires, or he may be given supplementary feedings. If the mother wants to continue breast feeding, however, feeding the baby from both breasts at shorter intervals is the better way since it stimulates more breast flow.

The stools of underfed babies may be normal in appearance but small in amount. But if food is decidedly insufficient, "hunger stools" result, which are more or less brown or greenish brown in color, contain little fecal matter and much mucus. Usually they are small and voided often. This stool may be misinterpreted, leading to further starvation and disastrous results.

If the condition is not corrected, baby becomes weak, apathetic, anemic, and generally malnourished. A conclusive test is to weigh the baby before and immediately after each feeding and calculate the amount he is getting. (See page 160.)

One mother relates that she was told not to weigh her baby but just to breast feed him every 4 hours, let him live without interference, and not to worry about him. The baby slept a great deal. He cried some but she did not know whether it was much or not. He was her first baby. She did not know how to judge successful feeding. She was not near a doctor until the baby was 1 year old, when a pediatrician told her her baby had severe rickets. At 3 years of age he still had a very noticeable Harrison's groove, resulting from rickets (a groove on the thorax in the middle of the chest).

Often an insufficient milk supply can be increased. Mothers should remember that the best known stimuli to increase flow of mother's milk are:

1. Stimulation by sucking infant (more frequent nursing means more stimulation).
2. Complete emptying of at least one breast at each feeding.
3. A calm mother.
4. A well-balanced diet for the mother with sufficient calories, protein, and vitamins, especially vitamin B_1.

Supplemental Feeding

If through no fault of hers or her family's, the mother, because of shock, worry, or the beginning of menstruation, finds her milk supply so diminished that putting the baby to the breast at more frequent intervals will not produce enough milk to satisfy him, or, if the mother becomes ill or is called away for one feeding, the baby may have to be given supplemental feeding. The best way to do this is to figure from a formula that would meet this baby's needs, offer him one bottle of this at each feeding and let him take as little or as much of it as he will.

Formulas for Supplemental Feeding

For a single feeding, offer the baby:

Up to 1 month of age, 2 ounces of milk, 1 ounce of water, ½ teaspoon of brown sugar.
From 1 to 3 months of age, 3 ounces of milk, 2 ounces of water, 1 teaspoon of brown sugar.
From 3 to 6 months of age, 4 ounces of milk, 3 ounces of water, 1 teaspoon of brown sugar.
From 6 to 9 months of age, 6 ounces of milk, 2 ounces of water, ½ teaspoon of brown sugar.

Offer this to the baby and let him take part or all of the mixture. The reason for the low amount of sugar in the diet in the later months is that by this time the baby will be having strained cereal and, as cereal increases, sugar should decrease.

Preparation of Supplemental Feedings

Mix the milk, the water, and the sugar and, stirring the mixture constantly, bring it quickly to the boiling point in a large open kettle; immediately remove from the heat till rapid boiling stops. Let it come to a boil in this way three times. Put the mixture into a sterilized bottle and cool it to body temperature before giving it to the baby. (See Appendix, page 363.)

When supplemental feeding is necessary after a breast feeding, give the baby as much as he will take of the formula adapted to his age. The baby himself will decide the amount. Sometimes the baby's diet may need to be supplemented after each breast feeding; at other times one or more supplemental feedings a day may be sufficient. If the baby is having 4 or 5 supplemental bottles, they may be mixed at one time for the day's feedings and put into separate bottles. Occasionally a mother may find it desirable to feed the baby entirely from the bottle at one of the day's feedings. In some cases supplemental feeding may need to precede the breast feeding; otherwise the baby may refuse the bottle although he needs this extra food.

Any milk left in the bottle after a feeding should not be used again for the baby.

For discussion of selection, care, and sterilization of bottles, see Appendix.

The Breast-Fed Baby Is Weaned

Baron Takaki, distinguished for ridding the Japanese Navy of beriberi, was asked at 80 years of age why he was so vigorous and in such fine physical condition. He replied that, being the only child of his mother, he had the advantage of her milk until he was 7 years of age. [21] Also, it has been reported that Eskimo women often nurse the youngest child for as long as 20 years. They feel that as long as they nurse a child they do not lose their youth.

In certain countries a long period of nursing may be advisable since the milk of other animals is not easily available. In the United States, however, where plenty of good pasteurized cow's milk can be so readily obtained, it is customary for women to wean their babies at about 9 months of age unless there is some good reason for continuing to nurse them. Such a reason might be illness of the baby, an epidemic in the community, the necessity for the mother to travel with her baby, or hot weather with no refrigeration. There is an old saying, "If you wean him in May, you wean him away." This saying probably originated before pasteurization and better methods of refrigeration were in existence. Because summer is usually a little harder time for the baby, it may generally be advisable to continue nursing him through the summer months even though he may be 11 or 12 months of age when weaned.

Breast-fed babies are less liable to infections and disturbances of the digestive tract than are artificially fed babies. In themselves, insufficient breast milk or menstruation of the mother, insufficient gain in weight, colic, or bad stools of the baby are not sufficient reasons for weaning. If the mother's milk is insufficient and more cannot be stimulated, additional food may be given from a bottle, but the mother should continue to give as much breast milk as possible. Often with special attention to the mother's diet and to her hygiene, her milk may be so increased as to be sufficient for her baby (see page 159). If the mother is unable to establish a sufficient flow of milk, she should keep in mind the fact that a little breast milk is better than none, and she should try to continue to give her baby some breast milk for 9 months if she can do so and if no serious illness interferes with this process.

It is considered best, when possible, to have the baby completely weaned from the breast by the time he is 10 months of age unless fresh milk is not available, as in some foreign countries.

According to old ideas, the time during which the baby was being weaned was most trying for all concerned. With the present knowledge of baby feeding, however, this is not true. This situation has been changed by improvement in the quality of market milk and in the knowledge of how to keep it clean and safe and by the gradual addition of foods other than milk to a baby's diet. The fact that the baby is accustomed to taking food from a spoon or cup is also helpful. The substitution, little by little, first of 1 cup of milk in place of 1 breast feeding in the middle of the day, then of 2 cups in place of 2 breast feedings, and so on, until no more breast feedings are given, makes the weaning process so gradual that the baby hardly realizes what is happening. It is best to take 1 or 2 weeks to complete the weaning process, leaving the feeding at night or early morning the last to be changed.

Foods Other Than Breast Milk

The breast-fed baby, like the bottle-fed baby, will need foods in addition to milk early in life. What foods to add, the amounts, the form in which to add them, and the age when they should be added will be considered after the discussion of the formula for the bottle baby.

Contra-Indications to Nursing

Parents sometimes ask if you think there are mothers who should not nurse their babies. Undoubtedly there are. All books on infant feeding have a list of "contra-indications to nursing," which means cases where mothers should not nurse their babies. A search through the literature, however, reveals few upon which all authorities agree. Some authorities say a pregnant woman can nurse her baby; others do not advise it. All authorities, however, seem to agree that in case of infection, such as whooping cough and pneumonia, cancer, active tuberculosis, and epilepsy, a mother should not nurse her baby.

The Baby Is Bottle Fed

For the baby whose mother cannot nurse him, artificial substitution is possible. This artificial feeding is certainly not new. In ancient Sweden in 1753, the governor of one area reported to the king that about one-half the children were dying during the first year of life because mothers went to work in the fields, leaving the baby with a sughorn, a cow's horn filled with gruel and sour milk, hanging over the crib. Authorities at that time, recognizing the danger of this, fined these women what amounted to about 80 cents in our money and gave this money to other mothers who had 5 or more children over the age of 6 years. [22]

Substitute for Mother's Milk

If a baby must be bottle fed, it should be recognized that he is at a disadvantage, not having his mother's milk, and every effort should be expended in making his feeding as nearly normal as possible.

Babies need food for energy, for growth and development. The baby's need for food is greater in proportion to body weight than at any other age. Carbohydrates and fats supply energy. Proteins may supply energy but are more significant nutritionally for body building. Minerals and vitamins are also necessary for growth and development.

Mother's milk contains the elements needed for energy, growth, and development of the little baby; therefore the food selected for bottle babies should be as near in composition to mother's milk as can be obtained. In the United States it is cow's milk. A good, pasteurized, fresh milk from a mixed herd is preferable. Goat's milk can be used and is modified in the same way as cow's milk. It has no special advantage in this country, however, where cows are tuberculin tested.

Comparison of Human Milk and Cow's Milk

Nature did not plan for the baby to have the same growth requirements as the calf which gets up and walks as soon as it is born. It will be noted from Table 5 that cow's milk has almost 3 times as much protein as mother's milk, almost 4 times as much calcium, and 6 times as much phosphorus, but only about one-third as much iron. Furthermore, the protein of cow's milk is largely casein, but in mother's milk there is a higher proportion of lactalbumin. Hence cow's milk forms a tougher curd in digestion. Casein is relatively deficient in the amino acid cystine which is essential to growth and development. The infant's cystine requirement however is met by 1½ ounces of cow's milk per pound of baby weight.

Obviously then, cow's milk must be modified to make it a suitable substitute for mother's milk. A dilution to reduce the protein content is necessary. When milk is diluted, to lessen the protein, everything else in the milk is diluted or lessened also. Although the protein, calcium, and phosphorus can easily be cut in half without harm to the baby, we should realize that when we dilute milk we reduce iron, fat, and carbohydrate also. To cut fat and carbohydrate cuts calories and fat-soluble vitamins. To cut iron, which is already only one-third as much as a baby would get from his mother's milk, may be detrimental to the baby unless steps are taken to make good the deficiency. Therefore sugar, to supply the energy which

Table 5. Comparison of Composition of Cow's Milk and Human Milk

		COW'S		HUMAN	
Specific gravity		1.031		1.031	
Protein, %	(total)	3.42		1.25	
Lactalbumin			0.56		0.75
Casein			2.86		0.50
N.P. nitrogen 6.38			0.20		
Carbohydrate, %	(total)	4.75		7.50	
Fat, %	(total)	3.50		3.50	
% saturated			67.4		43.5
% unsaturated			27.4		55.1
Ash	(total)	0.75		0.20	
Potassium			0.154		0.048
Sodium			0.061		0.011
Chloride			0.116		0.036
Calcium			0.122		0.034
Phosphorus			0.090		0.015
Magnesium			0.013		0.005
Iron			0.00007		0.0002
Copper			0.00006		0.00005
Ca/P ratio			1.35		2.26
Total solids (sum)		12.42		12.45	
*p*H		6.7		7.0	
% calories as protein		21.7		7.5	
% calories as fat		48.8		47.4	
% calories as carbohydrate		29.5		45.1	

Compliments of *Jr. Nutrition*, Vol. 13, page 253 (1937): W. M. Cox and A. J. Mueller, For cows and human milk composition.

dilution has reduced, egg yolk or liver soup, to add iron, and cod-liver oil, to increase the vitamin A and D content, are added from the beginning.

The infant's calorie requirement is approximately 50 calories per pound. This gradually diminishes to 40 calories per pound by 9 months of age.

THE INFANT'S ENERGY REQUIREMENT *

For basal metabolism	30 calories per pound	
Exercise	8 calories per pound	estimated
Growth and repair	5 calories per pound	
Loss in stools	3 calories per pound	
Total	46 calories per pound	

* Data from Dept. Pediatrics, Harvard Medical School.

Approximately two-thirds of the calorie requirement is met by milk and one-third by sugar.

Egg yolk adds protein and fat so that if the baby tends to be constipated after egg yolk is added to the formula the sugar may be increased by 1 or 2 teaspoonfuls to balance the total formula.

Since the protein of cow's milk forms a tougher curd than the protein of mother's milk, much attention in the artificial feeding of infants in the past was put upon the protein in cow's milk in an effort to find ways to soften the curd which results from the large casein content. In making artificial formulas milk has been diluted; it has been boiled; cereals (barley water), gelatin, alkalies (lime water), acids (lactic) have been added to produce the desired result. To be sure, babies do require protein for body building in an amount to meet their needs and in a form in which it can be utilized by the infant's delicate digestive mechanism. Usually boiling is all that is necessary to soften the curd.

Studies of the protein requirement of infants have brought various results all the way from 1 gram or 1.5 grams to 2.5 grams of protein per kilogram or per 2.2 pounds of body weight per day, with figures varying between these. Translating this into grams of protein per pound of baby's weight, we get approximately 0.45 gram per pound as the minimum figure and 1.1 grams per pound as the maximum figure. One ounce of milk yields approximately one gram of protein. Hess, planning for a margin of safety for an infant on cow's milk, allows 1½ ounces of milk (approximately 1.5 grams protein) for each pound of body weight per day for the normal infant. [11] Butler also suggests 1½ ounces of milk per pound of baby weight per day for adequate growth. [23] The National Research Council suggests that infants on artificial feeding work up to an allowance of 3 to 4 grams per kilogram or approximately 1.4 to 1.8 grams per pound of baby's weight by 6 to 18 months. This would amount to approximately 1½ to 1¾ ounces of milk for each pound of baby weight each day, if baby were having milk as the only protein. But well-fed babies by 6 months are having egg yolk or liver soup or both and cereal; therefore they would not need more than 1½ ounces of milk per pound of baby weight per day.

It has been our experience, also, that 1½ ounces of cow's milk per pound of baby weight is sufficient to meet the needs of the infant. As soon as the baby is accustomed to this formula, we add egg yolk. Many persons needlessly fear that eczema may result from egg yolk. We use egg yolk successfully with babies as young as 3 or 4 weeks of age. However, the milk is not raised above 1½ ounces per pound of baby weight per day until the egg yolk is well established. Eczema has cleared up in many infants by reducing the milk to 1½ ounces per pound of baby weight. If the baby does not seem satisfied after the egg yolk has been incorporated in the formula, it occasionally seems advisable to allow 1¾ ounces of milk per pound of baby weight, increasing the sugar proportionately so that the formula will be balanced. Babies on 1½ ounces of milk per pound of baby weight per day and one egg yolk have thrived, do not overeat, have developed normally without rickets or eczema, and have excellent color.

Modified Cow's Milk Mixture

In feeding a baby on a modified milk mixture it is important to remember that one "feeds the baby, not the formula." This means the formula should be adjusted to the individual baby.

The following steps must be taken in determining and preparing the baby's formula:

1. Calculate the amount of whole milk needed.
2. Calculate the total amount of modified milk mixture needed.
3. The difference between these is the amount of water to add to the milk.
4. Calculate the amount of sugar to add.
5. Prepare the egg-yolk addition.
6. Mix the milk, the water, and the sugar, and boil the mixture; add it to the egg yolk; put the mixture into sterile bottles.

For care of bottles, see Appendix, page 363.

Boiling

Raw milk should never be used without being boiled, because of the danger of streptococcus sore throat and undulant fever (or malta fever), which, in spite of the best of care, can sometimes crop up. Boiling assures a safer milk, since it destroys undesirable bacteria. It also changes the form of the curd in milk, increasing the ease with which it is digested. For this reason we advise boiling even pasteurized milk.

How To Calculate Amount of Whole Milk for One Day

It has been estimated that 1½ ounces of whole cow's milk for each pound of baby weight each day will meet the baby's total needs for protein (muscle-building material), and calcium and phosphorus (bone-building material). For example: A two-month-old baby weighing 9 pounds would require 9 times 1½ or 13½ ounces of whole milk. If the milk thus calculated equals a fraction, use the next higher number or, as in this case, 14 ounces of milk. If a baby is underweight, he should be fed according to what he should weigh and allowed to take what he wants and should not be fed according to what he actually does weigh.

How To Use Overrich Milks

Many babies suffer digestive disturbances from milk too rich in fat or from milk containing fat of large globules. Both characteristics are common with the Jersey and Guernsey breeds of cows. Too high a percentage of fat content may also be present in special grades of milk sold as "Certified," "Guernsey," "Jersey," and other trade names irrespective of the breed or mixture of breeds from which the milk came. If such milk must be used, 2 ounces of cream should be skimmed from the top of each quart of milk after it has stood for at least 3 hours. Cod-liver oil, halibut-liver oil, or percomorph oil will supply the vitamin A thus removed.

How To Determine Total Amount of Modified Milk Mixture for One Day

The total amount of modified milk mixture to be prepared for the day is the amount the baby can take at one feeding times the number of feedings in 24 hours. Although babies differ in the amount they can take at a feeding, the following rules suggest what the average baby's capacity at different ages is likely to be:

> Under 1 month of age, 5 or 6 feedings of 3 ounces at each feeding.
>
> Over 1 month of age on a 4-hour schedule, 2 ounces more than his age in months at each feeding. On a 3-hour schedule, 1 ounce more than his age in months at each feeding.

Thus an average baby of 2 months on a 4-hour schedule will take 4 ounces at a feeding; on a 3-hour schedule he will take 3 ounces at a feeding.

By an average baby is meant one who weighs 7 or 7½ pounds at birth, 12 to 12½ pounds at 3 months, 14 to 15 pounds at 6 months, 21 to 22½ pounds at 1 year.

Table 6. Approximate Amount of Formula Baby Receives per Feeding, According to His Weight

BABY'S WEIGHT IN POUNDS	SCHEDULE	AMOUNT IN OUNCES PER FEEDING
5 or 6	3 hour	2
7 or 8	3 or 4 hour	3 or 4
9 or 10	4 hour	4
11 or 12	4 hour	5
13	4 hour	7
14	4 hour	8 *

* By the time a normal baby has reached 14 pounds in weight he will be getting additional solid food at each meal, and hence his little stomach will not hold more than 8 ounces of liquid even though liquids pass out of the stomach more rapidly.

If a baby is born weighing more than average, the amount of food he will take should be calculated on his weight. Thus the baby mentioned earlier, who was born weighing 12 pounds, was at birth the size of an average three-month-old baby and should be fed accordingly. Calculate his formula on the basis of 12 pounds of weight (see Table 6) and permit him to decide how much of this he can take and digest without regurgitation (spitting it up). Babies should not regurgitate food. If they do, there is something wrong with the diet, either qualitatively or quantitatively.

Number of Feedings Daily

Little babies are not like adults. They cannot be put upon 3 meals a day. There are several reasons for this. The baby's stomach is much smaller than the adult's and cannot act as a reservoir for storing food as an adult stomach does. A baby's stomach at birth can hold about 2 ounces (4 tablespoons), at 1 year, about 8 to 10 ounces (1 cup), while an adult's can accommodate 64 ounces (2 quarts). Baby's stomach is more upright with less pouch in the fundus than an adult's.

Also, according to Carlson, a baby feels hunger pains more quickly and more severely than an adult. [24] This is probably why he yells so vigorously when he is hungry.

The number of feedings given in 24 hours varies with different babies. The average healthy baby may be given only 5 feedings a day, even at first. If the feedings are given at 4-hour intervals, they will come at 6 A.M., 10 A.M., 2 P.M., 6 P.M., and 10 P.M., or any similar sequence, beginning at 5, 7, or at 8 A.M. Some babies may need for a time to be given an additional feeding at 2 A.M., making a total of 6 feedings. This feeding is usually dropped by the time the baby is 2 or 3 months old, when baby shows that he will sleep through the night. The 10 P.M. feeding is usually dropped at 5 or 6 months of age, leaving only 4 feedings a day. Just when these night feedings are omitted is determined by the baby's growth and his ability to sleep throughout the night.

The Amount of Water To Be Added to the Milk

Milk, other than mother's milk, is *never* fed undiluted to little babies because of the high amount of protein.

To determine the amount of water to add to the milk, multiply the number of feedings in 24 hours by the number of ounces of mixture to be given at a feeding and subtract the number of ounces of milk used in the day's formula. It is well to add an extra ounce of water to allow for evaporation during heating. Thus a three-month-old baby, weighing 12 pounds and getting 5 feedings of 5 ounces each, would have a total of 25 ounces, 18 ounces of milk and 8 ounces of water (one for evaporation). Water used to cook the family vegetables may be saved and used as part (1 to 2 ounces) of the water for the baby's formula. This vegetable water is particularly valuable if baby tends to be constipated or if he is not getting egg yolk in his formula. The vegetable water could be any in which the family's vegetables had been cooked *except* cabbage, cauliflower, onions, navy beans, or beets. The water should be salted but should have no other seasoning. It should be strained and kept in an air-tight, covered jar in the refrigerator and should not be kept more than two days. Its addition to the baby's formula should be gradual, ½ ounce the first day, and 1 ounce the second day. Watch baby's bowels to be sure he does not get too much.

The Amount of Sugar To Add to the Milk Mixture

To meet the baby's energy needs, sugar must be added to the diluted milk. Milk sugar (lactose) or Dextri-maltose should be used if possible. Cane or ordinary table sugar, brown sugar or Karo, are all less good since they are sweeter than milk or Dextri-maltose and so may spoil the baby's appetite for other necessary bland foods, which he must learn to take later. If used, dark Karo and brown sugar are preferable to cane sugar because of their greater nutritive value.

The following shows the relation between the weights and the measurements of these sugars:

1 ounce of cane sugar	equals	approximately	2	level	tbsp.
1 ounce of brown sugar	“	“	3	“	“
1 ounce of milk sugar (lactose)	“	“	3	“	“
1 ounce of Dextri-maltose	“	“	4	“	“
1 ounce of Karo (corn syrup)	“	“	2	“	“

One-tenth ounce of milk sugar, Dextri-maltose, or Karo is used to each pound of baby's weight up to the point when the baby's weight requires 1½ ounces of sugar a day. When more than 1½ ounces of these sugars is needed, it is better to furnish the additional energy in the form of a little well-cooked strained cereal, either added to the milk or fed from a spoon. Because of the sweetness of cane sugar, we do not believe it wise to use more than a total of ¾ ounce or 1½ tablespoons of cane sugar in a day's formula.

If too much sugar is given, the stools may be frequent and watery; too little sugar may result in constipation. If the baby is constipated, milk sugar may be found to be more laxative than cane or Dextri-maltose, and cane sugar is somewhat more laxative than Dextri-maltose. Sometimes commercial Dextri-maltose has a laxative added; this form of malt sugar should be avoided. There are three types of Dextri-maltose on the market. Dextri-maltose No. 1 has comon salt added, Dextri-maltose No. 2 has no additions, and Dextri-maltose No. 3 has potassium bicarbonate, a laxative, added. Since cow's milk apparently has much more sodium chloride (common salt) than breast milk (see page 169) and, since we do not want to have baby become accustomed to a laxative, only Dextri-maltose No. 2 should be used.

How To Add the Egg Yolk

Because cow's milk has only about one-third as much iron as has human milk, egg yolk should be added to the baby's diet at 3 or 4 weeks of age, that is, as soon as he has become accustomed to a modified milk mixture. To add egg yolk to the modified milk mixture put about ¼ teaspoon of egg yolk into a cup and add some of the hot modified milk, stirring constantly to prevent curdling. When this mixture is smooth and sufficiently thinned, add it to the whole day's milk supply just before chilling. If the baby takes this mixture well and thrives on it, a day or two later the amount of egg yolk used may be doubled. If he continues to handle it well, in another day or two the amount of egg yolk may again be doubled. This procedure may continue until at 4 to 5 weeks of age the baby is taking a whole egg yolk daily.

The Complete Formula

The bottle-fed baby's complete formula should include:

1. One and one-half ounces of milk per pound of baby weight; a fresh pasteurized milk not to exceed 4 per cent fat and with the fat in small globules is preferable; these characteristics are common in the milk of Holstein and Ayrshire cows.
2. Water to dilute the milk since cow's milk contains too high a proportion of protein for a human baby; to determine the amount of water to use, multiply the number of feedings in 24 hours by the ounces given at a feeding and subtract the number of ounces of milk to be used; add an extra ounce for evaporation.
3. One-tenth ounce of sugar per pound of body weight to make up the needed calorie value.
4. Egg yolk to increase the iron which, already low in cow's milk, is lessened by dilution.

General rules for increasing baby's formula:

If baby is gaining about 5 ounces a week, increase the milk ½ ounce a week and the sugar ½ teaspoon a week if Dextri-maltose and ¼ teaspoon if cane sugar.

If baby is gaining 8 ounces a week, increase the milk ¾ ounce a week and the sugar ⅔ teaspoon a week if Dextri-maltose and ⅓ teaspoon if cane.

It is best to calculate the formula from the baby's total weight at least once a month (see page 171).

Preparation of Total Feeding

The milk, the water, and the sugar for the entire day's feedings are mixed and then stirred constantly, so they are brought quickly to the boiling point in an open kettle and then removed from the heat until there are no bubbles present. The mixture should come to a boil in this way three times; then it is removed at once from the heat. The egg yolk, prepared as previously directed, is then added.

There should be enough sterilized bottles for all feedings for 24 hours. (See Appendix, page 363.) The amount of freshly mixed food required for one feeding is put into each sterilized bottle. Each bottle is covered with a clean sterile cover and put in a cold place. At feeding time, the bottle is warmed to body temperature before it is given to the baby.

Examples of procedures in making modified milk mixtures follow.

Example 1. Normal Baby. Suppose a baby 2 weeks old had been a normal, average 7-pound baby at birth and, at 2 weeks of age, after the common initial slight loss in weight, he again weighs, as is normal, 7 pounds. This baby would probably be fed at 4-hour intervals, receiving 5 feedings a day. His 4-hour feeding schedule might be as follows: 6 A.M., 10 A.M., 2 P.M., 6 P.M., and 10 P.M. Since an average baby at 2 weeks of age may take 3 ounces at a feeding, he will need a total of 15 ounces a day. The day's formula, therefore, is made as follows:

Milk: 11 ounces (7, his weight in pounds, times 1½ ounces, or 10½ ounces. Use 11 ounces, the next whole number.).

Water: 5 ounces (a total of 15 ounces of formula after boiling).

Sugar: 2 tablespoons of milk sugar (7, his weight in pounds times ⅒ ounce, the sugar required per pound of weight), 7/10 times 3 (the number of tablespoons of milk sugar to one ounce) is 2.1 or approximately 2 tablespoons.

After this mixture of milk, water, and sugar has come to a boil 3 times, it makes a total of about 15 ounces to be divided into 5 bottles, with about 3 ounces in each bottle. If the baby wakes regularly at 2 A.M. an extra feeding of 3 ounces would be needed. This may be managed simply by adding an extra 3 ounces of water, that is, 8 ounces instead of 5 in making the mixture. Additional boiled lukewarm water may be given to this baby between feedings.

Example 2. A Baby Whose Weight Is below Normal. Suppose the two-week-old baby weighed only 5 pounds at birth, and at 2 weeks had regained his birth weight of 5 pounds. It seems natural to suppose that this baby would not be able to digest well as much food as the average 7-pound baby. Therefore he is given only as much food as he can take well; he is fed more often than the 7-pound baby and his food is made qualitatively as good as possible until he gains sufficient strength to take more. As he gains strength and can digest more food without regurgitation he should be fed according to what he should weigh for his age. This little baby on a 3-hour feeding schedule may be receiving 7 feedings a day of only 2 ounces at a feeding, or a total of 14 ounces. His meals may come at 6 A.M., 9 A.M., 12 M., 3 P.M., 6 P.M., 9 P.M., and 2 A.M. His formula is made as follows:

Milk: 8 ounces (5, his weight in pounds, times 1½ ounces, 7½ ounces).
Water: 7 ounces (to make a total of 14 ounces after boiling).
Sugar: 1½ tablespoons of milk sugar (5, his weight in pounds, times ⅒ ounce, the sugar required per pound of weight).

After this has come to a boil 3 times, it makes about 14 ounces to be divided into 7 bottles, with about 2 ounces in each bottle. This baby may well be given boiled water between feedings if awake, because a baby as small as this may be somewhat "dehydrated"; that is, he may not have the normal amount of water in his tissues.

Example 3. A Baby Who Is Larger Than the Normal Baby of His Age. Suppose this healthy baby, also 2 weeks old, weighed 10 pounds at birth and, after a slight loss, at the end of 2 weeks had regained his birth weight. He is about as large as an average 2-month-old baby and so can take more at each feeding than can the smaller babies. He may be receiving at 4-hour intervals 5 feedings a day: at 6 A.M., 10 A.M., 2 P.M., 6 P.M., and 10 P.M., with 4 ounces at each feeding instead of 3, which was given the baby of normal weight. Since he approximates an average 2-month-old baby in weight he gets 2 ounces more at a feeding than his age in months, or 4 ounces. He will be having a total of 20 ounces of milk mixture. His formula is made as follows:

Milk: 15 ounces (10, his weight in pounds, times 1½ ounces, the milk required per pound of weight).
Water: 6 ounces (to make a total of 20 ounces after boiling).
Sugar: 3 tablespoons of milk sugar, or 4 tablespoons of Dextri-maltose (10, his weight in pounds, times ⅒ ounce, the sugar required per pound of weight).

After this has come to a boil 3 times, it makes approximately 20 ounces to be put into the 5 bottles, each containing about 4 ounces. This baby, too, should be given boiled lukewarm water between his feedings.

If a baby is unusually fat, he should not be expected to take as much food per pound as an average infant.

Giving the Baby His Bottle

If a baby must be bottle fed, there is no reason why he should be chucked into his crib with the bottle propped up to his mouth and obliged to take his food with no thought or attention being paid to him. If you have ever been ill and have had to eat lying flat on your back, you must realize what a difficult task it is. Aside from this, there is the more important point that a little cuddling is just as necessary, may even be more so, for the bottle-fed baby than for the breast-fed baby. Experiments in hospitals show that the baby who has some cuddling does much better than the one who does not. When giving the baby the bottle, the mother should hold him in her arms in much the same position as a breast-fed baby would be held. (See Fig. 6.) She gives the baby a feeling of security by her arm around him, her looks, and she may even say to him as he eats, "You're a nice baby" or some similar remark showing approval. Babies, as well as adults and older children, like approval and profit by it. In fact, we are not so sure but that his digestion is better for this approval at his meals. One of the authors has noticed, as she was feeding a little baby in her arms from a bottle, the wild look of an animal apparently afraid that his food was to be taken away, and has seen this look disappear as she quietly gave her approval in simple words, "You're a nice baby."

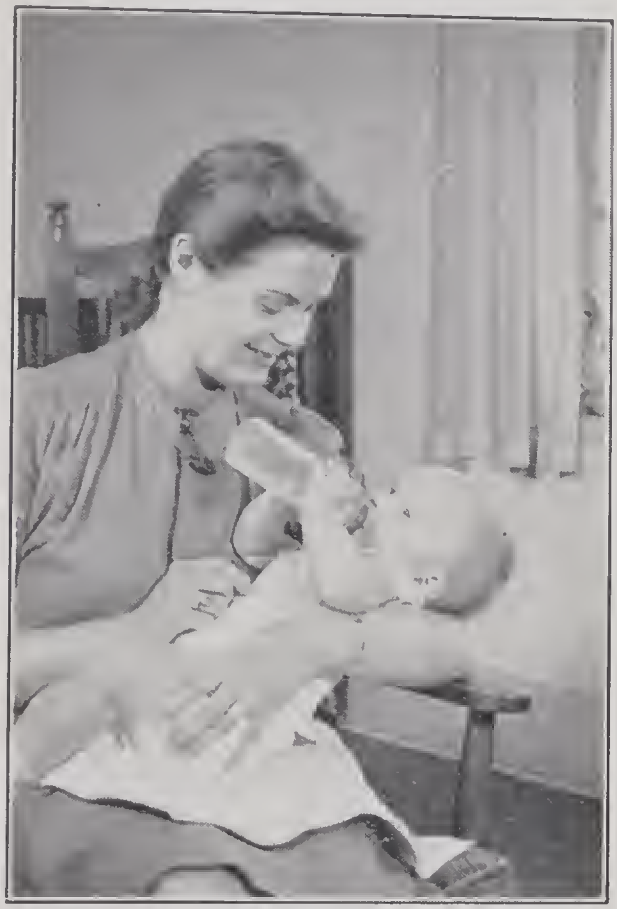


Fig. 6. Jimmie is held comfortably and affectionately when given his bottle.

Exceptions to the General Rule in Artificial Feeding

Just as there are contra-indications to breast feeding, so there may be contra-indications to cow's milk. For instance, if the mother of an artificially fed baby were obliged to travel with her baby, or if she were located in a place where good fresh cow's milk were not available, unsweetened evaporated milk or dried milk might be used. The use of sweetened condensed milk is never advisable because of the high concentration of sugar. Also, it may be wise for this mother to take with her on these journeys ready-prepared canned, strained cereals, fruits, and vegetables.

In using evaporated or dried milk it must be remembered that they have been heat treated long enough to expel much water. Just what else has taken place we do not know. Recent experiments, however, have shown that evaporated milk contained 60 per cent less thiamin than an equivalent amount of raw summer milk. We do know, however, that these milks are still excellent sources of protein and calcium, our main reason, at present, for using milk.

To reconstruct these milks:

1. *Evaporated Milk.* In using evaporated milk in infant feeding add an equal amount of water to the evaporated milk. That is, if 8 ounces of evaporated milk and 8 ounces of boiled water are used, it is equivalent to 16 ounces of milk similar to cow's milk. Proceed from this point to dilute; add sugar, and treat in the same way to make the formula as if using fresh milk. (See page 171.)
2. *Dried Milk.* In using dried milk in infant feeding, use 6 level tablespoons of the milk powder and stir in enough boiled water to make 16 total ounces; then proceed to make baby's formula by diluting this reconstructed milk in the same way as fresh milk. (See page 171.)

There is no need for other proprietary infant foods except for the sugars used in the milk formula. We agree with Dr. Holt that they add nothing to, but detract much from, our infant-feeding practices.

Many kinds of acids have been used to lower the buffer action of cow's milk, that is, to counteract its neutralizing effect upon the hydrochloric acid of the gastric juices and thus make for greater ease of the digestion of the protein. Practically all edible acids have been tried, including lactic, hydrochloric, citric, and acetic. Lactic acid has been used for years in the form of buttermilk when feeding sick infants and is now used by some physicians in its chemical form. Acetic acid has also been used in the form of vinegar, and citric acid used in the form of orange juice or lemon juice. If an acid must be used in baby's formula it seems that lemon juice, tomato juice, or orange juice are preferable when put into the bottle after it has been warmed and just before being served, since they should be given the baby as a source of vitamin C. However, in 21 years of experience in the feeding of over 1000 babies, we have not found it necessary to follow the above practices. Dilution of the milk and boiling to soften the curd seem to be all that is needed to make it suitable for the baby. Let us emphasize again the need for simplicity in infant-feeding formulas.

Weaning the Bottle-Fed Baby

In weaning a baby from the bottle to the cup much the same process may be used as weaning a breast-fed baby (page 166). With a bottle-fed baby weaning to the cup may be started earlier. If the baby is well, and developing well, there is no reason why soon after he begins to sit up at

5 or 6 months of age, he should not have water, orange juice, and, later, milk from a cup. Give first 1 cup in place of 1 bottle feeding (preferably in the midmorning or in the middle of the day), then 2 feedings from a cup, then 3 feedings from a cup, leaving the night feeding as the last one to be given from the bottle. Or the baby may be given a little from a cup at the first of each feeding, gradually increasing the amount given until the baby gets all his milk from the cup.

The Baby Gets Foods Other Than Milk

Both breast-fed and bottle-fed babies need food other than milk early in life. Since mother's milk is nature's food for the baby, breast-fed babies will not need additional foods as early as bottle-fed babies.

Studies made by the New York State College of Home Economics of more than 1000 babies indicate that babies given foods other than milk early in life were able to sit, stand, and walk earlier than those on diets without these foods. [12, 25, 26]

The baby, his development, and what has been done to his milk are the deciding factors as to when to add foods other than milk.

If cow's milk is used in place of mother's milk, sugar should be added for energy, and egg yolk or strained liver for iron.

When pasteurized, boiled, evaporated, or dried milk is used, some form of vitamin C is needed.

At about 3 months, baby is more active; he kicks, he raises his head, and he may be turning from side to side. All this requires energy. About this same time baby begins to drool, which means more saliva with increased ptyalin, which helps digest starch; therefore we begin strained cereal.

At 6 to 9 months, baby normally begins to have teeth. These teeth are helped through with such foods as zwieback, hard toast, or crust of dry bread.

From 6 to 12 months, baby is becoming more active. He is awake more of the day, he learns to stand and later to walk; hence he needs more energy in the form of cereal, fruits, and vegetables. As the energy foods increase, the need for thiamin (vitamin B_1) increases; therefore we give strained *whole* cereal. Also during this period, to help the teeth that are just coming through and to teach him to use them, he might be given a bone to chew. Be sure that it will not splinter.

The baby will learn with little difficulty to eat new foods if his mother will remember to introduce each food gradually by giving him one at a time in small amounts when he is hungry. She should give the new food just before his milk or give a little milk, then a little of the new food, then more milk, and should begin by having his first taste of a new food not too thick in consistency. Gradually it may be given to him a little thicker until finally it is taken in its normal consistency.

Water

Boiled water should be kept in a sterile closed jar at room temperature. It should be offered to both bottle and breast-fed babies twice a day from a sterile bottle at first and later from a cup, letting the baby take as much as he likes. Bottle, nipple, and jar should be sterilized daily (see Appendix, page 363) and fresh water boiled each day.

Baby may refuse water since either mother's milk or baby's formula may give him enough. The mother should not worry about this but should continue to offer it to him daily so that he can have it when he wants and needs it. Exercise, heat, dry atmosphere, and increased urination and perspiration may all call for extra water in a baby as well as in an adult.

Orange or Tomato Juice

If milk is pasteurized, boiled, evaporated, or condensed, the feeding of orange juice or tomato juice should be started as soon as the baby has learned to take the bottle or at about 2 or 3 weeks of age. Mother's milk, on the other hand, may or may not have sufficient vitamin C; this will depend upon the amount the mother gets in her food. It is advisable, therefore, even with the breast-fed baby, to start orange juice or tomato juice the first month of life.

The baby should be fed strained orange or tomato juice daily. Begin with ¼ teaspoon and increase gradually until he is getting 1 to 2 tablespoons at 6 months of age and 5 to 6 tablespoons of orange juice, or the juice of 1 orange at 1 year of age. When substituting tomato juice, use twice as much. According to the National Research Council (see Appendix, page 355), the baby should work up to an allowance of 30 milligrams of vitamin C by the time he is 6 to 18 months of age. One-fourth cup of orange juice contains approximately 30 milligrams of vitamin C.

The tomato juice may be either fresh or canned. Orange juice should be strained through a fine sieve. The juice either may be given from a teaspoon or it may be diluted with an equal amount of boiled water and given from a sterilized bottle. It may be given between any two feedings.

Since orange or tomato juice is given to babies because of the vitamin C content which prevents scurvy, and since this vitamin is destroyed by heating and exposure to air, fresh juice should be used each time. If juice must be kept for two feedings, it should be kept in a covered container in the refrigerator to minimize the loss of vitamin C.

Cod-Liver Oil

When man put on clothes he deprived himself of much of his ultra-violet light from the sun. When he built a house around himself, he deprived himself of still more of this precious light, for even though he spent his life sitting at the closed window he would get little, if any, ultra-violet light through the glass. The sun's rays, coming in contact with the skin, can activate the provitamin (sterol) of the skin and change it into vitamin D, the vitamin necessary to protect children from rickets (see page 52). The anti-rachitic effectiveness of these ultra-violet rays of the sun varies with season, time of the day, clouds, smoke, fog, and dust in the air. At high altitudes the intensity of the ultra-violet rays is so great that one burns easily. The rays are more intense in summer than at other seasons, and at noon than in early morning or late afternoon. That is why for sunbaths we prefer the noon hours during late fall, winter, and spring; and early morning or late afternoon in the summer.

In the northern states people tend to spend too much time in cold weather indoors and to keep children in as well. Since the ultra-violet rays are much less potent at this season, it is not surprising that rickets is more prevalent in these months. It is also not surprising that in tropical countries, where children spend more time out of doors, rickets is less common. It has been said that in warmer countries even indirect sunlight or skyshine may give sufficient protection against rickets. Therefore, if your baby is given daily sunbaths on his nude body (see page 196), he may not need any other form of vitamin D during the summer to make his bones and teeth develop as they should.

As soon as cold weather comes on with less ultra-violet rays available and you put baby into clothes and bring him into the house for the greater part of the day, cod-liver oil or some other source of vitamin D should be given. Cod-liver oil has its advantages as a source of vitamin D because it furnishes vitamin A, which baby may also need, and iodine, which is likely to be lacking in milk in inland states.

Many mothers of babies think that because the baby is fat he does not need cod-liver oil. Fat babies are often the ones who need it most, for a baby can build fat without necessarily building good bone and achieving good resistance, and it is primarily for bone development and resistance to infection that the vitamins D and A of cod-liver oil are given. A study of 298 babies showed that infants without gross symptoms of rickets received orange juice and cod-liver oil earlier and were breast fed longer than those showing such symptoms. [26]

The baby should be given a drop or two of cod-liver oil daily when he is 2 to 3 weeks of age, or as soon as orange or tomato juice is established in his diet. This amount should be increased gradually, that is, a drop at a time, until he is getting ¼ teaspoon daily at 3 months of age, ½ teaspoon daily at 6 months of age, and 1 teaspoon daily by the time he is 1 year old.

The National Research Council (see page 355) suggests that a baby receive 400 to 800 International Units of vitamin D by the time he is between 6 and 18 months of age. The babies, under the supervision of the authors, were getting 1 teaspoon of cod-liver oil by 1 year of age, an amount which gives at least 340 units of vitamin D. The amount of vitamin D varies with different oil; read the label for the exact amount. In addition to cod-liver oil these babies were having daily egg yolk or liver, both good sources of vitamin D, and were exposed to sunshine or skyshine daily whenever possible.

We consider it wise to use this conservative amount in view of the fact that research shows some decrease in appetite with a high vitamin D intake during infancy.

Vitamin D apparently affects the linear growth of infants. Studies show, however, that the effect of vitamin D on increasing linear growth reaches a maximum when the vitamin D intake is greater than 135 and less than 1800 units, probably about 340 to 600 units daily.

In some infants there was a decrease in appetite, resulting in food refusals with the high dosage of vitamin D. The decrease in growth observed might be ascribed to small food intake, but some infants had excellent appetites throughout the study and the growth rate could be increased by decreasing the daily vitamin D intake. The depression of appetite occurred as often when the vitamin was given in concentrated form as when it was given as 3 teaspoons of oil. [27]

Cod-liver oil may be given to the very young or delicate baby from a medicine dropper. As the baby gets older, it is given from the tip of a teaspoon. It is best to give cod-liver oil at the same time each day between any two feedings. Most mothers like to give it after the baby's clothing has been removed for his bath, as it is difficult to remove cod-liver oil stains from clothing. If the baby is given a daily sunbath, cod-liver oil may not be necessary for vitamin D. The vitamin A requirement is easily met without cod-liver oil by milk and egg yolk. Additional vitamin A is stored in the liver, and so some should be stored when he is getting cod-liver oil. The war has made cod-liver oil somewhat inaccessible. Table 7 gives other available sources of vitamin D and their cost.

Table 7. Sources and Cost of Vitamin D

Substance	International Units		Approximate Amount Equivalent to 400 I.U. of D	Units of Vitamin A in Amount of Oil Containing 400 Units of Vitamin D	Cost per Purchasable Unit, Feb., 1942		Cost of 400 Units of Vitamin D *
	A	D			Price	Amount	
			OIL				
	per gram		*tsp or drops*		$		$
Cod-liver oil	1,000–2,000	150–250	½–1 tsp	2,700–4,860	0.45–1.29	4–14 oz	0.006–0.0099
Cod-liver oil (flavored)	700	95	1 tsp	2,940	1.09	16 oz	0.0100
Cod-liver oil concentrate	49,920	4,992	3 drops	3,993	0.50	6 cc	0.0069
Cod-liver oil with viosterol	1,800	400	⅓ tsp	1,800	0.65	3 oz	0.00776
Cod-liver oil with percomorph-liver oil	6,000	850	⅛ tsp	2,820	0.74	3 oz	0.0040
Haliver oil	10,000–60,000	170–2,000	6 drops–¾ tsp	10,000–24,000	0.45–1.49	10–50 cc	0.010–0.013
Haliver oil with viosterol	30,000–50,000	3,333–10,000	1–4 drops	2,000–3,600	0.79–4.49	5–50 cc	0.004–0.012
Viosterol in oil	0	10,000	1 drop	0	3.69	50 cc	0.0033
Oleum percomorphum (50% cod-liver oil)	60,000	8,500	2 drops	3,000	2.69	50 cc	0.003
Natola	55,000	5,500	2 drops	3,850	2.39	50 cc	0.004
Drisdol with vitamin A	100,000	10,000	1 drop	4,000	1.75	10 cc	0.008
Navitol	55,000	10,000	1 drop	2,200	2.67	50 cc	0.0024
Adex oil	21,000	4,200	3 drops	2,100	0.69	10 cc	0.007
			CAPSULES				
	per capsule		*number of capsules*				
Cod-liver oil tablets	850	85	5	3,995	1.00	110	0.043
Cod-liver oil concentrate tablets	3,120	312	1	4,056	0.89	100	0.012
Caps-O-Cod	3,334	334	1	4,001	0.69	100	0.008
Haliver-oil capsules with viosterol	8,500	1,700	⅕ ‡	1,700	0.89	25	0.007
Haliver-oil capsules (plain)	8,500–10,000	145–170	½ to 3	23,000–24,000	0.43–1.29	25–100	0.005–0.048
Oladol (haliver oil, natural vitamin D)	9,400 †	940 †	½	3,760	0.60	25	0.010
Natola capsules	9,400	940	½	3,760	2.19	100	0.009
Navitol capsules	9,400	1,700	¼	2,162	2.39	100	0.0055
Drisdol with vitamin A	10,000	1,000	½	1,000	2.25	100	0.009

1 teaspoon is approximated to equal 120 drops; 1 gram equal to 32.43 drops; 1 drop equal to 0.3 gram; 1 teaspoon equals 3.7 grams. Authority—drug store containers.

* National Research Council's minimum recommendation, January, 1943, 400 International Units.

† International units per gram. No figure given per capsule.

‡ Vitamin D is stored in the body. If ⅕ capsule meets the daily needs, take one capsule every 5 days.

Cereal

At about 3 months of age the average baby begins to drool. Many mothers mistake this for teething but apparently it has no relation to teething. It simply means that the baby's saliva has increased and, along with it, the baby's ability to digest starch. Interestingly enough, a baby at this age is more active physically. He may be beginning to raise his head, to turn from stomach to back or vice versa. Such activity means the need for more calories, and more calories increase the need for thiamin (vitamin B_1) which affects energy metabolism. Hence, it seems wise to begin feeding a little strained whole cereal at 3 or 4 months of age.

Some of the cereal from that cooked for the family may be used. It should be strained through a fine sieve and given to the baby at one of his morning feedings just before giving him the breast or bottle. Begin with ¼ to ½ teaspoon of strained cereal diluted with 1 tablespoon of boiled milk or formula. Feed it to the baby from the tip of a teaspoon. As the baby learns to take the cereal well, it may be made thicker by using as much as 1 tablespoon of cereal to the same amount of milk. When the baby has learned to like it, he may be given cereal also at the evening meal. The cereal may be increased in amount at each of these two meals until the baby is a year of age, when he will be taking about ½ to ¾ cup of cereal twice a day.

Sugar and cereal are both energy foods, but strained whole cereal gives baby minerals and vitamins, which sugar does not. Therefore it is well to increase the cereal as rapidly as baby can take it well. And, as cereal is increased, sugar should be decreased in the formula. For every 2 tablespoons of cereal that baby receives daily, he will be given 1 tablespoon less of Dèxtri-maltose and ½ tablespoon less of cane sugar in his formula until he gradually gets no sugar at all.

Egg Yolk

According to Bunge's experiments with puppies, rabbits, and kittens, the young animal has stored in its liver at birth three times as much iron as the adult. [28] Also, experiments have shown that the relatively long-continued feeding of a diet only of milk to rabbits and rats caused anemia. Mackay, in studying infants in London, found anemia quite prevalent. She found that breast-fed infants were susceptible to anemia but less so than bottle-fed infants. [29] Since breast-milk contains almost three times as much iron as *undiluted* cow's milk, and since, therefore, fewer breast-fed babies become anemic, it may not be necessary to add foods rich in iron as early to the diet of the breast-fed baby as to that of the bottle-fed baby. This is probably why some of the older books on pediatrics and infant feeding say that for a breast-fed baby you can expect pink cheeks with a cream background, while with a bottle-fed baby the background of the skin will be white. This, however, should not and need not be the case. If your baby's skin is white, egg yolk or strained liver soup should be added to his diet. If bottle-fed babies are given the right diet, their color will be as good as that of breast-fed babies. It is for these reasons that we add egg yolk to our bottle-fed baby's formula as soon as he is 2 or 3 weeks of age. (See page 175.)

When the breast-fed baby is about 4 or 5 months of age, the feeding of egg yolk may be begun at the noon or the 1 P.M. or the 2 P.M. meal to great advantage. The baby should be given only the egg yolk and no egg white. The yolk should be carefully separated from the white and poached or cooked in a custard cup set in a pan of water. The water should be heated slowly until it is just below the boiling point, when the egg yolk is set but still soft. Then a few soft bread crumbs may be added to the egg and mixed well. Bread crumbs may be softened with a little boiled water or boiled milk. For the first few days, the baby should have only a part of this, but the amount should be increased daily until by the end of 2 or 3 days he is taking the whole egg yolk. Since egg yolk feeding is started after the baby has learned to eat thick cereal, it is not difficult to get him to take it. The bottle-fed baby may be given his egg yolk from a cup in this same manner rather than in his formula after he has learned to take solid foods.

Zwieback, Toast, or Bread Crust

Georgie dear, Georgie dear,
  Don't you know the truth!
Turn the gas a little higher,
  Go and tell your Aunt Maria
Baby's got a tooth.

ANONYMOUS

How well we all remember this old song, and how excited parents get over baby's first tooth! Baby's teeth begin to appear usually one at a time at about 6 to 9 months of age. (See Appendix.) This is the time when baby should be given something to chew. He is now able to sit alone. He may be creeping. He is certainly more active; hence it is time for him to have in his daily diet an energy food that can be chewed, that gives exercise to teeth and jaws—zwieback, hard white toast, or a crust of dry bread. It should be given to him when he is hungry, preferably just before one of his feeding periods, and is a good way to keep him happy as he sits and waits for other food to be prepared. Not to begin a chewable food at this time retards the lesson of chewing and swallowing that he needs to learn.

Vegetables

Usually the baby is ready for vegetables at 5 to 8 months of age. He already has learned to take cereal and egg yolk, and so the giving of vegetables should be very simple. The vegetables first given to the baby may be peas, carrots, spinach, string beans, or asparagus tips taken from the family pot after they have been cooked and lightly salted but before any other seasoning or any fat has been added. They should be strained and given from the tip of a teaspoon at the midday, 1 P.M., or 2 P.M. feeding, when the baby is hungry and before anything else is fed. Start with ½ teaspoon of sieved vegetable and increase gradually until baby gets 2 to 4 tablespoons at 1 year of age. If a baby has a tendency to constipation, vegetable feeding may be begun earlier. In such a case, the strained vegetables may be started when the baby is 4 to 5 months of age, or as vegetable water given from a bottle (see page 173), or in his formula at 2 or 3 months of age.

Parents have often asked, "Can't I give baby canned vegetables?" The answer has been, "How would you like canned vegetables 365 days in the year?" Give baby canned vegetables when the family has canned vegetables or when the family has a vegetable which baby cannot have, such as cauliflower, cabbage, onions, beets, or navy beans. Then open a small can of a strained vegetable for baby. But when the family has fresh-cooked vegetable, think enough of your baby to strain a little for him.

Fruit Sauces

After a baby has become accustomed to egg yolk, toast, strained cereal, and vegetables, he may be fed strained prunes, apricots, or applesauce. This is usually started at 5 or 6 months of age at the 10 A.M. or midmorning feeding. Start with ½ teaspoon of strained fruit and increase gradually until baby gets 2 to 6 tablespoons at 1 year of age.

Meat

When a baby is taking vegetables well, at 5 or 6 months of age, and when the family has liver, a small thin piece, about 1 inch square, may be cooked below the boiling point for 10 minutes with the vegetable toward the last of its cooking. Then it may be put through the strainer with the

Table 8. *When To Add Foods to the Infant's Diet*

FOOD	APPROXIMATE AGE TO START	COMMENTS	WHY GIVEN
Colostrum	1st day of life	First food baby gets from mother's breasts for first few days of life. Baby gets this for from 1 to 12 days.	Is nature's provision for baby. Is low in fat, high in protein and mineral. Is laxative and clears out the alimentary tract. Is thought to contain antibodies to protect infants from disease.
Mother's milk	2d to 12th day of life	Comes into breasts usually 2 or 3 days after the baby is born, though it may not appear for 12 days.	Is baby's best food. Is made to fit baby's needs. Is the simplest way to feed a baby and is beneficial to his mother.
Cow's milk or milk of another animal	9 to 12 months or at birth	In America begin it at 9 to 12 months of age, but in countries where no milk of other animals is available continue breast milk longer. Where human milk is not available, cow's milk may be started at birth.	Because mother's milk usually gives out and cow's milk is available. Everyone needs the milk of some animal throughout life.
Cod-liver oil or its vitamin D equivalent	2 to 3 weeks	In regions where sunshine is not available, some form of vitamin D should be given throughout infancy. We like to give a form rich in vitamin A and iodine also.	Vitamin D has been found necessary to prevent rickets in infants. It can be made in the baby's body if he is exposed directly to the sunshine.

Orange juice	3 to 4 weeks	It may not be necessary for a breast-fed baby to be given orange juice if his mother receives plenty of vitamin C in her diet. But as soon as a baby is given pasteurized, boiled, evaporated, or dried milk of any kind, some good source of vitamin C, such as orange juice, should be given to him. (For other sources of vitamin C, see Table 16, Chapter 11.)	Vitamin C is necessary in a baby's diet to prevent infantile scurvy.
Cereal	3 to 4 months	At 3 to 4 months of age a baby begins to raise his head, to turn from side to side and to be more active. He also begins to drool, which means he has more saliva and therefore more ability to digest starch.	Cereal is needed to supply the increased demand for energy. It should be a strained whole cereal because, as energy demands increase, thiamin (vitamin B_1) needs increase also.
Egg yolk or strained liver	2 to 3 weeks if bottle-fed; 4 to 5 months if breast-fed	A breast-fed baby with sufficient iron in his diet and getting sunshine or other source of vitamin D may not need egg yolk or liver until he is 4 to 5 months of age. A bottle-fed baby whose diet is very low in iron needs egg yolk or liver at 2 to 3 weeks of age.	Iron is necessary in the diet to prevent anemia. Babies (especially bottle-fed babies) without egg yolk or liver added to their diet are likely to develop milk anemia.
Strained vegetable and strained fruit sauces	5 to 8 months	As soon as cereal is well started, strained vegetable may be added to the diet. In case of constipation, however, vegetable water may be put into the formula when baby is as young as 3 to 4 weeks of age. When vegetables are well started, strained fruit sauce may be given if bowels are not too loose.	Strained vegetables and fruit sauce given in as small amounts as we give them to babies contribute little in the way of mineral and vitamins. They are, however, frequently a good laxative for a baby and given at this age they get a baby accustomed to taking vegetables and fruits needed in later life. Green or yellow vegetables—spinach, peas, carrots, string beans, asparagus tips—should be used.

Table 8. When To Add Foods to the Infant's Diet (Continued)

FOOD	APPROXIMATE AGE TO START	COMMENTS	WHY GIVEN
Zwieback, toast, or crust of bread	6 to 9 months	As soon as the baby begins to have teeth, at 6 or 9 months of age, he needs something to chew on.	Hard bread in some form gives exercise for the teeth and, as baby learns to take ½ to 1 slice, it also gives energy to a baby becoming more active.
Desserts as baked custard, tapioca custard, or rice custard	8 to 9 months	At 8, 9, or 10 months of age baby begins to creep. It takes much energy.	While cereals have been increased and bread added for energy, the baby at this age no longer has sugar in his formula, and so a simple dessert of this nature is acceptable.
Meat	10 to 12 months	Teeth, probably started at 6 months, are increasing on the average of one a month to 18 months. A bone with a little meat on it gives baby a chance to use his teeth. When he gets used to this, a little chopped meat may be given.	A meat bone that cannot be swallowed and cannot splinter off is much better to help teeth come through than a teething ring. If a little meat—chicken, turkey, lamb, or beef—is left on the bone, it helps baby learn to chew. Between 12 and 18 months of age, some of the same kind of meat chopped may be given. Meat is a good source of complete protein, iron, and thiamin (vitamin B_1).

Potato	11 to 12 months	A child is usually going places at this age, and so needs additional energy.	Potato is a good source of energy, iron, and vitamin C. It should be well cooked, mashed, and served with a little milk or, later, with very little butter.
Butter	12 months	If baby is getting his quota of milk and some fish oil daily, he will not need butter in the first year.	Butter is a fat food which gives energy and vitamin A. It retards passage of food from the stomach. Since baby's stomach is small, it is best to withhold butter until end of the year, then put very little on baby's bread or potatoes.
Fresh fruit	12 months	Since baby's food is all strained during the first year, fresh fruit is usually not given. One-half to one small ripe, but not over-ripe, banana may be given at one year. Other fresh fruit will be given as juice.	Fresh fruit contains nothing not found in the juice except cellulose, which baby does not need. Therefore give all fresh fruit juices—orange, grapefruit, lemon, pineapple, strawberry—and leave fresh whole fruit, except bananas, for his second year.

Foods not mentioned in this chart are not considered a part of the one-year-old child's diet.

We also realize that this chart will not apply to all children. The time at which foods are added to the diet will depend upon the baby. Since a baby should be fed according to his physical development rather than his chronological age, there may be exceptions to the previously mentioned chart. The average normal infant, however, should be ready and able to take foods listed at the time stated.

vegetable and given to the baby. Liver and vegetable soup of this kind might be used daily in place of egg yolk for the babies (of "Jersey" mothers) who tend to gain fast and to be constipated. Egg yolk is richer in fat than is liver and vegetable soup.

Several babies who have come under our direction and who had low blood counts have been brought up to normal by the daily consumption of egg yolk and liver soup. One of these children, after adoption, returned several years later as a summer nursery-school child and had as high a blood count as any child in the Nursery School.

Aside from liver, no other meat will be given a baby until he has 3 or 4 teeth, when he may be given a bone on which to chew. A good bone, for this purpose, is a leg bone of chicken or turkey or a bone from veal, lamb, or beef that cannot be swallowed or does not splinter. Parents should examine the bone carefully before giving it to the baby.

The mother should keep constant watch of all the signs of good health in her baby so that she will avoid the mistake of crowding the baby's diet with an excess of total food or of any single food. Eczema, constipation, regurgitation, diarrhea, and refusal of foods are common and unnecessary results of mistakes in feeding.

In feeding babies, it is particularly important to remember that, though we have gone a long way in the science of nutrition, we do not know it all yet. Therefore it seems advisable to *stick to the food that has been as little tampered with by man as possible.* It is for this reason that we advise feeding babies breast milk wherever possible. Put them in the sun in summer without cod-liver oil, percomorph, or any of the many other oils or concentrates used for vitamin D. In the winter months where there is little sunshine, use all the sunshine and skyshine available, both indoors and out; also use daily cod-liver oil or other fish-liver oil or the oil strained from the top of a can of salmon, sardines, or other fat fish. Products of this kind contain vitamin A and also iodine, which may not be sufficient in the milk of mothers and animals living inland, away from the sea.

Give babies nature's orange juice or tomato juice for vitamin C, not man's manufactured products such as ascorbic acid or civitanic acid. Use plain, strained whole cereal, vegetable and fruit from the family pot, and, where possible, raise some or all these vegetables and fruits in the family garden. This procedure is better for a baby as well as for the person planting, cultivating, and harvesting the food.

If a baby, for any reason, cannot have mother's milk, use nature's next best food, boiled fresh cow's milk, rather than evaporated, condensed, or dried milk. Add milk sugar for calories, if families can afford it, because it is the sugar taken from milk. Brown sugar may be used where families must economize.

Father Can Help with the Baby

Baby's time spent with his father should also be a calm and happy time. Food alone, no matter how well planned, how well balanced, how completely it meets baby's needs, cannot produce a well-nourished baby. In addition to proper food, if your baby is to develop normally, he needs a calm, happy environment, exercise and play, sleep, sunshine, regular elimination, bath, proper clothing, companionship, and regularity of routine. It is in providing these factors in the baby's life that the father also can contribute much. Many babies hardly know that they have a father, and this, we think, is unfortunate for both baby and father. Father from the beginning should be allowed and encouraged to take an active part in the bringing up of his children. He can give even the newborn baby orange juice, water, and later his solid foods if he is around at feeding time. He can put him to bed, give him his exercise and even give him his bath and his sunbath on days when he is at home. If the father will select at least one duty for which he is responsible, he and the baby will become better acquainted, and both should profit by the experience.

Calm Environment

If a baby's life is worried, nervous, nagged, and unhappy, he may not be able to digest his food no matter how well planned. Cannon showed this plainly in his experiments with cats. He fed two groups of cats well and treated them well. They ate their food and grew normally. Then he brought a dog into one group. These cats became nervous and worried and could not digest their food. When Dr. Cannon analyzed the digestive juice, he found it quite reduced in amount. [30] Sometimes things go badly in the office or home, but father and mother should learn to talk it over quietly at night after the children have been put to bed. There's an old saying that, if you stop to count ten before you let your anger get the best of you, you will feel much better. Waiting, therefore, until evening may be a relief to you as well as to the children. Father's time with his children is so short that it should be a satisfyingly happy time.

Exercise and Play

Exercise is also an important part of each baby's development, though few parents seem to realize it. Years ago before the cause of rickets was known, a doctor in London claimed that rickets in babies was often due to too little exercise and too much food. He claimed that this combination produced a condition of acidosis from incompletely oxidized food and this excess acid in the baby's system drew upon the calcium for neutralization.

The exercise given to a little baby should be perfectly normal and as free as possible. A good way to begin with the young baby is to let him lie on a bed and kick without clothing or with only his diaper, at first for 5 or 10 minutes and later for as much as ½ to 1 hour. Some parents like to do this just before the baby's bath.

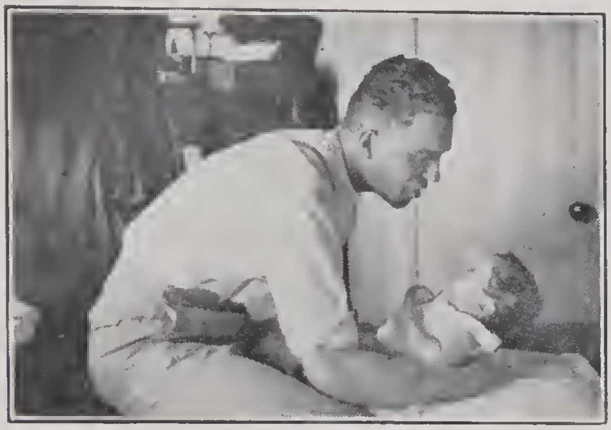


FIG. 7. Daddy helps little Jane get her exercise.

When baby is very young he can be left alone to exercise, but as soon as he has learned to turn or roll over, an adult must be near unless baby is in an enclosed bed or pen or on the floor not too near a stove, radiator, or fire. It is also possible to make the hour before the evening meal baby's play and exercise time and to let father take an active part in this. This play should not be jostling up and down but rather a kind of play or exercise that means real development for baby. One of the loveliest relationships of this kind is shown in Fig. 7. The baby's father from early infancy let her hang to his fingers and gently raised her a very little at a time, then more and more as the baby grew. He exercised her feet and legs in the same way lifting them straight and very, very little at first, holding firmly around the ankles. At 6 months the dad was able to swing the baby gently by holding to her hands or her feet. It was obvious that she enjoyed it by her chuckle over the experience.

FIG. 8. Give the older baby plenty of space for exercising.

Another excellent method of exercising baby is to put him, either nude or in a diaper only, on his stomach on a blanket or quilt in front of the fireplace or near a radiator in winter or upon the dry grass in summer. At first let him exercise for 5 or 10 minutes, and gradually increase the time until he is having an hour of this kind of exercise daily. Bright-colored, non-breakable toys with no sharp edges, such as rubber balls or rubber dolls, are very good to encourage creeping. Many mothers are afraid that a baby will take cold if put upon the floor in the winter, but we have done this regularly with our home-making-apartment babies and rarely has one taken cold. If a student who is caring for the baby has a cold, however, she either keeps away from the baby or puts a cloth over her nose when handling the baby.

We believe that babies with right food, fresh air, sunshine or skyshine, exercise, and plenty of sleep are less likely to take colds or other diseases than babies not so treated. (In fact, we have called in a doctor for illness but three times for forty-one practice-house babies who have been under our supervision.)

The Bath

Parents of today do not realize how fortunate they are in having some one show them how to bathe their baby. Practically any hospital will demonstrate the bathing of the baby for the mother if she asks for it, or often public health nurses can be consulted. They show the mother how to undress her baby, how to hold his back and head carefully in giving his bath, how to wash his face without danger of getting water in his eyes and ears, and how to wash his head without danger to the soft spots or fontanelles, so that baby's bath from the beginning can be a relaxed happy time for him. If this service is not available, the mother can learn the proper method for bathing a baby at a clinic or by watching a friend bathe her baby. Carefully bathed babies love their daily bath as all well babies should.

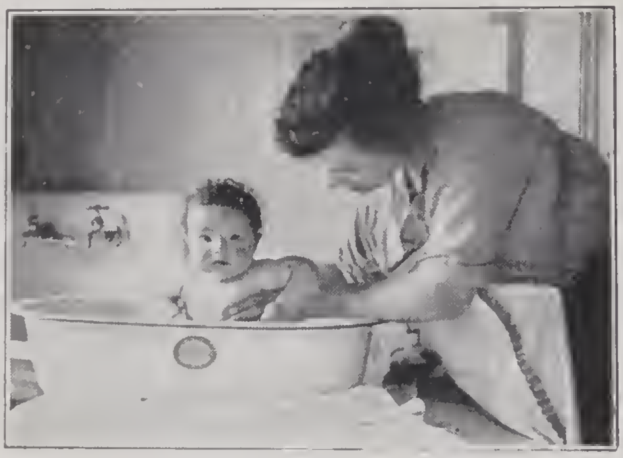


FIG. 9. Make bath time a happy time.

Sleep

When a baby is born he sleeps practically all the time that he is not eating, or about 20 to 22 hours a day. As he grows the mother will notice that he sleeps less and less until by the end of his first year he will require but 15 to 18 hours of sleep, depending upon the child, his food, the amount of fresh air he gets, the occurrence of sudden loud noises and other factors in his environment. Parents should not feel that they must walk around on tip-toe and whisper while baby sleeps, neither should they bang doors, shout back and forth, or have a radio on at full blast. It should be remembered that baby is as human as an adult.

As the baby sleeps less, part of his waking hours should be spent with the family. At about 4 or 5 months of age he might have ½ hour in the forenoon, just lying raised up very slightly with pillows in his buggy in the room where mother is working, and another ½ hour just before the evening meal exercising with dad, this period continuing to increase as he approaches the end of his first year.

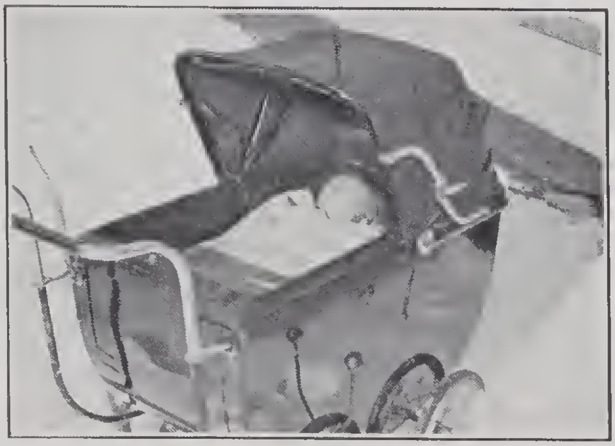


FIG. 10. Baby naps out of doors, even in the winter.

Nap Out of Doors

Babies should take their naps out of doors all through the winter if possible. A baby should be bundled up well, of course, and put on the side of the house protected from strong winds. Sunbaths should be given if the day is pleasant. The story of the Dionne quintuplets up in the North country should give us courage to put our babies outside, for, as Dr. Dafoe says,

> After the babies arrived at the hospital they were introduced for the first time in their lives to the northern sun and the invigorating out-door air. Commencing gradually, they soon began to spend hours under warm wrappings on the veranda, in the fresh air, and this was continued throughout the winter months. They immediately began to show a definite improvement; their faces filled out, their eyes sparkled, their legs became straight and plump, their "tummies" developed good proportions, and these happy little souls soon took on the rotund appearance of little puppies. [31]

The quintuplets at this time were less than 4 months old and were weighing about 6 pounds for the smallest (Marie) and about 8¾ pounds for the largest (Yvonne).

Sunbaths

All babies need sunshine or its equivalent every day of the year (Fig. 11). Cod-liver oil or other form of vitamin D (see D sources, page 184) may take the place of the ultra-violet rays of direct sunlight when the latter is not available. It is well to remember that skyshine has some value though not nearly as much as direct sun. Baby should be put out daily. There are a few precautions to be observed in giving sunbaths to infants. The mother should stay outside a few minutes to see how hot it is. It is wise to have baby's head toward the sun so that the shadow of the baby's forehead protects the eyes from the strong glare of the sun.

If the baby is born in October or later, the sunbaths will have to be started more gradually. First accustom the baby to the fresh air by allowing him to sleep in a room with his windows open. After he is a month old he can sleep in his carriage out of doors for his nap, except when the weather is below zero, protected from the drafts by the hood of the carriage. After a week or so of such treatment, when the day is warm enough, the carriage may be put in the sun, at first for 5 minutes, increasing the time to 10 minutes the second day and to 15 minutes the third, keeping booties or socks on the feet during this process. Then the feet might be added to this exposure in the same way, later the head and arms, and, as the weather gets warmer toward spring, the whole upper part of the body and finally the legs and lower part of the body. Allow each part of the body to have 5 minutes the first day, 10 the second, and 15 the third, until the whole body is being exposed for 15 minutes. Then the whole body may be exposed for 20 minutes in another 2 days, and for 30 minutes in another 2 days, and so on, until the body is being exposed for 1 hour at a time on warm days. The time for sunning the baby in fall and winter is between 10 A.M. and 2 P.M. In winter it is best to give the sunbath as near noon as possible and to protect the baby from strong winds. If the weather is cold, it is better to put the baby in an open window, having the direct sunshine come upon the baby's skin. Protect the baby from any draft by the buggy top with blankets covering it, the door into the room being closed.

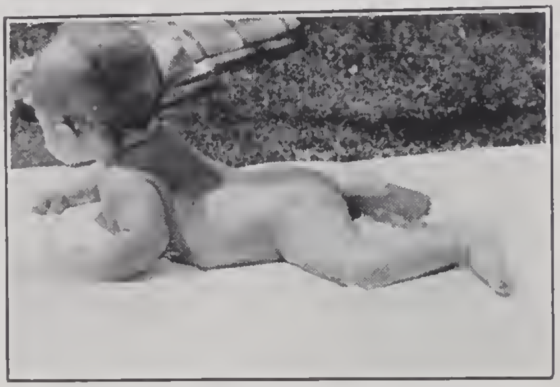


FIG. 11. Start sun baths at an early age.

If baby is born in the summer he may be put out in his carriage for naps almost as soon as he comes from the hospital, and by the time he is 3 or 4 weeks old his sunbaths may begin on his whole body. Begin with 3 minutes on the front; then 3 minutes on the back as well as on the front the second day; then 6 minutes on front and 6 on back the third day; then 12 on front and 12 on back the fourth day; and so on up to ½ hour on each side. Then the exposure should be for ½ hour before 10 A.M. and for ½ hour after 2 P.M. daily.

If the sun is extremely hot and glaring, it may be advisable to protect the eyes with the hood of the buggy or blanket hung over the hood. However, according to some physicians, there seems to be little danger of a baby's eyes being affected by the ultra-violet light or sunshine. Furthermore, if the light is too glaring, the baby or any animal will tend, as experiments have shown, to turn the head and avoid the direct rays of the sun.

In exposing the baby to the sunshine it should be remembered that the best hours in the spring, fall, and winter are between 10 A.M. and 2 P.M., but during the hotter months of the summer the time should be before 10 A.M. and after 2 P.M.

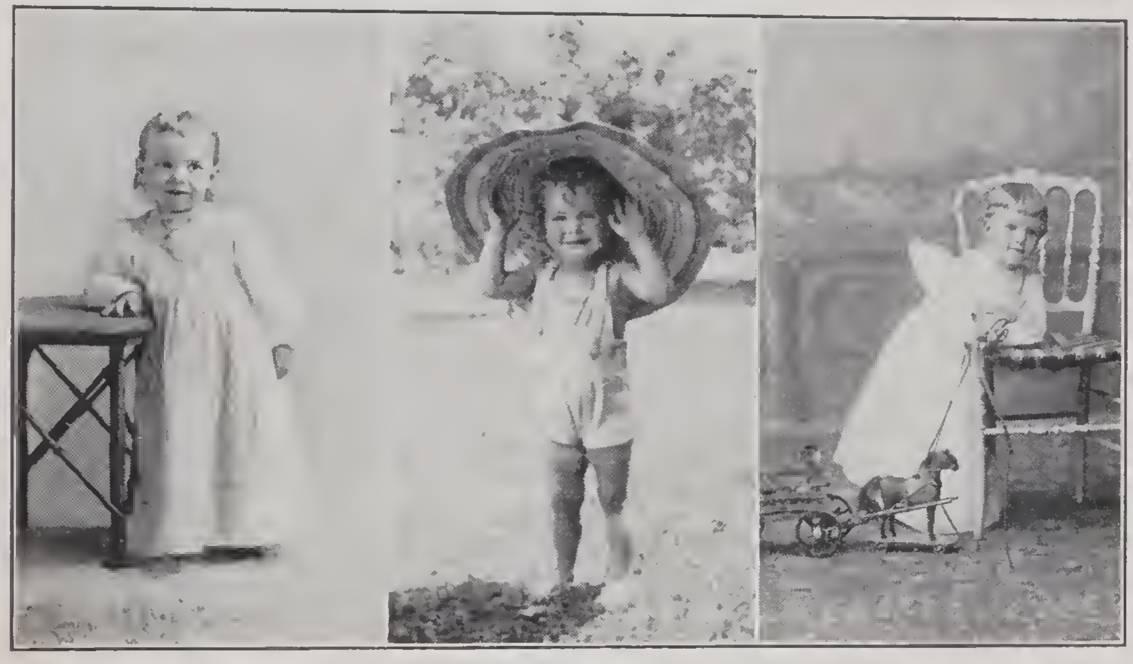


FIG. 12. Clothes of today and yesterday.

For the child who has been accustomed through the spring, summer, and fall to exposure to sunshine, the clothing may be such that he wears socks on all the warm days throughout the year in order to expose his knees to the direct rays of the sun. This is better not only from the standpoint of giving the baby the sun exposure but also it means that if a baby is kept in warm rooms he does not become overheated and is less likely to take cold than one who is dressed in warm heavy flannels when indoors.

On damp cold days or when the house is cold and chilly, it may be better to put the baby in long stockings, covering the knees, or to put on leggings when he goes out, though there is really no reason to suppose that knees accustomed to sunshine and fresh air cannot become as toughened as the face and hands to weather changes. It is generally realized that, except in very cold weather, it is not necessary to cover the face in order to protect it from the cold.

The toddler from 1 to 1½ years may be put in his pen or fenced area with only panties in late spring, summer, and early fall, given his toys and allowed to stay 1 to 2 hours at a time in the sunshine. As the child becomes more independent, he may be dressed in a sun suit and allowed to run in the yard. Sun suits which allow the most exposure of the skin to the sun are best (Fig. 12). How much better the clothing of children today than when many of us were children!

Children exposed to the sun, of course, become warm and perspire. In taking a child into the house after a sunbath, it may be well to sponge his body with lukewarm water and to give him a drink of moderately warm water. It must be remembered that cold water applied either to the skin or taken internally as a drink may cause a shock to the child's nervous system and so should be avoided.

These directions are applicable to and have been used successfully by many babies in New York State and that means, of course, they can be used in any comparable climate.

Parents of children might, however, take advantage of what sunshine is available even indoors for their children. Window glass does screen out a large percentage of the ultra-violet rays; nevertheless a little sunshine is better than none—house animals do take advantage of it. One of the writers is always interested to watch her dog follow the sun around the house and lie in the best spot of sun no matter how small. So it may be advisable to put children in the sun even indoors when possible.

Bowel Movement

Mothers should learn to study baby's bowel movements. The number, kind, and consistency of the baby's movement are one of the best indications of how baby is handling his food. Soon after he gets home from the hospital and feeding is proceeding normally, his stools should be normal as described on page 144.

Clothing

Baby's clothing should be simple and there should be very little of it. Babies under supervision in the practice house rarely wear anything in the house but a diaper and undershirt. If the little baby awakens in the morning in a house that is cool, a bathrobe or a sweater and long stockings may be put on him, or the lower part of his body may be kept covered with a blanket. Rubber diapers should be used only when baby is taken visiting. One little girl in the practice house never had a dress until she was 12 months of age and then, when taken calling, she wore a dress made of one plain piece of material, hemmed at top and bottom, with arm holes cut in and a tape to draw it up at the neck. This dress, opening down the back, allowed plenty of room for exercise.

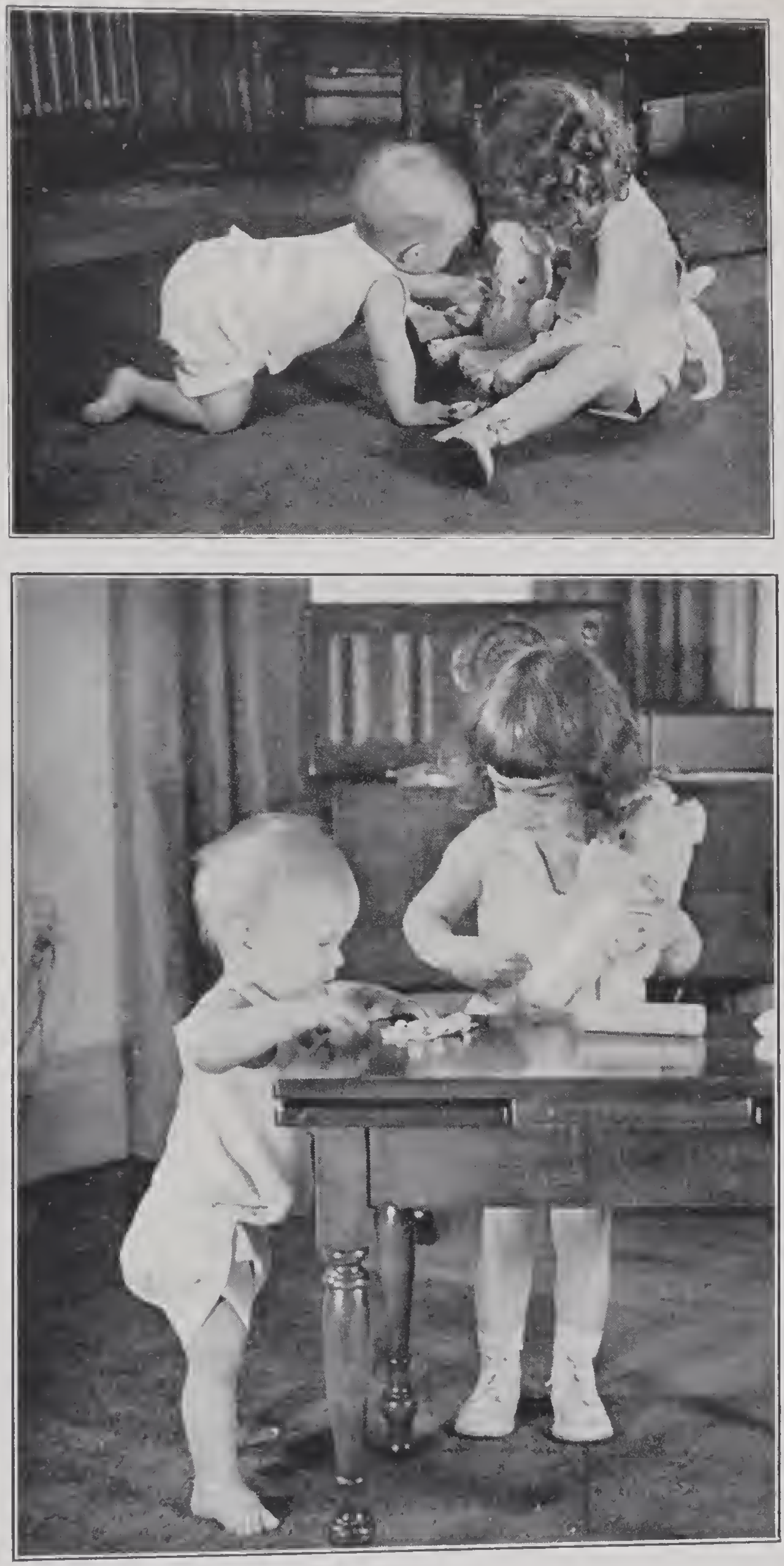


FIG. 13. Jimmie, the present Homemaking Apartment baby, age 10 months, enjoys the companionship of Jean Marie, a former Homemaking Apartment baby.

Frequently mothers overdress little children. This not only interferes with the child's free play but also keeps the mother so worn out with the making and laundering of their clothes that she may be too tired, nervous, and irritable to give her best to her family.

Companionship

Wise parents think of their child and all his needs early in life. In addition to the companionship of calm, happy adults, a child toward the end of the first year should begin to have companionship of or as near his own age as possible. This should be only one other child and for only an hour or less once a week at first, with an adult watching closely. The time may be increased as the child grows older, until by the time he is 1½ or 2 years of age he is playing for 1 hour or more daily or every other day with some other child of or near his age.

To play with other children of his age has several advantages for the child. In the first place, he learns to adjust to society early in life, to play ball so to speak, to give and to take. In the second place, it gives the parents a chance to see some other child, and if they are at all observant they will soon learn that what they may have considered abnormal or supernormal in their child is just normal. Also, with another child around, parents are bound to divide their attention. This, too, is good for their own youngster.

When we have two practice house babies they are brought together daily at 4, 5, or 6 months of age and older for their play period in front of the fireplace, with an adult constantly on guard. The babies as well as the adults enjoy and profit by this experience.

Schedule

So much has been written on schedule versus non-schedule that we think the modern parent might become bewildered by it. However, we should all realize that babies are human and that there are certain things to which as human beings all must conform. Therefore the sooner a child learns the routine essentials to his social adjustment, the better it will be for him and for all concerned.

To accomplish this a pattern of necessary routines should be set up and an effort made to adhere to it with each baby.

The following is suggested as one which has proved satisfactory in many actual situations.

	MORNING
6:00	Feeding
6:30	Chair (bowel movement)
7:00–9:30	Sleep or play, depending upon age Water to drink
9:30	Cod-liver oil Orange juice Bath
10:00	Feeding
10:30	Chair (urination)
10:30–2:00 *	Sleep out of doors or sunbath

	AFTERNOON
2:00	Feeding
2:30	Chair (bowel movement)
2:40–5:35 *	Wheeled out in carriage or sunbath Play time (part time out of doors, part indoors)
5:35	Offer water to drink Chair for urination
5:45	Undressed
6:00	Feeding
6:30	Chair (urination)
6:40	Bed
10:00	Feeding (for little baby if necessary)

* These hours may be used as part of the baby's sunbath. It should be given between 10 A.M. and 2 P.M. in fall, winter, and early spring months, and before 10 A.M. or after 2 P.M. in the summer.

The hours and times for various routines will necessarily depend upon baby and his family. For instance, some mothers prefer for a 4-hour feeding schedule 7, 11 A.M. and 3, 7, 11 P.M. Some prefer 5, 9, 1, 5, 9. Some babies will have a 3-hour feeding schedule, 6, 9, 12, 3, 6, 9. Some mothers find it easier to bathe baby at 7 A.M. or earlier. In some homes the house is not warm enough for a bath this early in winter. Again, many mothers prefer to give the bath at bedtime. Sunbaths, naturally, must vary with the season. Many other factors may alter the schedule permanently or for a day or two. Yet in the long run in a well-organized home no baby goes without meals at fairly regular intervals during the day, and plans are made for him to have daily fresh air, sunshine, water, play, exercise, bowel movement, bath, and sleep.

When baby is very young, he will sleep most of the hours of the day that he is not being fed or bathed. He should nap a little out of doors in the day time. Later, less and less sleep will be necessary until, by the end of the year, he will sleep not more than 15 or 18 hours a day and his waking hours will be filled more and more with free play or exercise.

Baby Comes to the Family Table

The smaller the baby, the smaller his stomach and the more rapid his gain. Hence a little baby needs more total food, that is, more calories per pound the first 6 months of life than he does later. It is not unusual for mothers to notice a little lag in appetite toward the end of the year. For, as baby nears his first birthday—along about 10 or 11 months of age—he may show you that he is not as hungry as he once was. With some babies this happens at 7 or 8 months of age. The mistake should not be made of forcing any food at this time. This must not be interpreted as meaning that the giving of other foods should not be begun. It is a sign that the child may be ready for longer intervals between feedings. In fact, by 10 to 12 months of age most children are ready for 3 meals a day. Whether the child sits in his high chair at the family table for these 3 meals depends upon the attitude of all members of the family. If having his high chair brought to the family table subjects him to tastes of pancakes, pie or doughnuts, which his little stomach will have to hold long enough to cause indigestion, lack of appetite, or constipation, then he had better have his meals by himself before the family is fed. His 3 meals at 10 months to 1 year of age should be about as follows:

Meals for the Older Baby

As He Nears His First Birthday

Breakfast (between 7 to 8:30 A.M.)
- ¼ to ½ cup tomato juice or orange juice
- ¼ to ¾ cup oatmeal strained with top milk
- ¼ to ½ slice bread or zwieback
- 1 cup milk

Midmorning (10 A.M.) or *midafternoon* (3 to 4 P.M.)
- 1 teaspoon cod-liver oil
- ¼ cup tomato juice or orange juice
- Water to drink

Dinner (between 11:30 A.M. and 12:30 P.M.)
- 1 egg yolk or 1 serving liver and vegetable soup or 1 serving liver (1 slice, 1 inch square)
- ¼ to ½ baked potato (small) or 2 to 4 tablespoons mashed potato
- ½ to 1 small carrot or 1 to 4 tablespoons other vegetable strained
- ¼ to ½ of a baked apple with no skin or 2 to 4 tablespoons applesauce or stewed apricots or prunes
- ¼ to ½ slice bread or zwieback
- 1 cup milk

Midafternoon (3 to 4 P.M.)
- Water to drink

Supper (5 to 6 P.M.)
- 2 to 4 tablespoons of apricots or other fruit strained
- ¼ to ½ cup strained oatmeal
- ¼ to ½ slice bread or zwieback
- 1 cup milk

The cod-liver oil and orange juice or tomato juice may be given in midafternoon if baby naps in the morning.

If, after this program is tried, baby still seems hungry, a piece of bread or zwieback could also be given at the cod-liver oil feeding and a small cup of milk if this does not spoil baby's appetite for the next meal. The authors have found that at this age many babies cannot take a full quart of milk each day without loss of appetite, constipation, or eczema. If this situation eixsts, fruit juice or fruit sauce may be used with the bread at the between-meal feeding.

If the family has meat with the right kind of bone for baby to chew (see page 192), it could be given either at the noon or evening feeding.

It should be remembered that it is much, much easier never to let baby taste food not in his diet than to let him get the taste and then to try to stop him from wanting everything he sees.

According to the National Research Council (see page 355), a child under 1 year should have 100 calories per kilogram or 2.2 pounds of weight, which for a 21-pound baby would be 945 calories. This same child would need approximately the following:

31.5	grams protein (approximately 1½ grams per pound).
1	gram calcium.
6	milligrams of iron.
1,500	I.U. vitamin A.
133	I.U. vitamin B_1 (0.4 milligram).
30	milligrams vitamin C.
0.6	milligram riboflavin.
4	milligrams nicotinic acid.
400 to 800	I.U. vitamin D.

Table 9 shows how a day's meals may be planned to meet the child's needs in all respects. The particular foods included may not be used each day, and food nutrients will vary somewhat with different foods. For instance, on days when orange juice is used in place of tomato juice, the vitamin C content of the diet will be raised. When liver is used, all the vitamins and iron as well will be higher than in the diet described. When green vegetables such as strained peas, chard, mustard greens, dandelion greens, or beet greens are used, the iron and vitamin A content of the diet will rise considerably. On the other hand, when prunes are used in place of apricots, the iron content of the day's diet will fall. However, over a period of time, with the daily meals made up of foods typical of that given in the illustration, the diet will tend to even itself up from day to day.

The diet given figures high in everything with the exception of vitamin D, which is minimum. This figure does not account for the formation in the body of vitamin D through the action of the sunshine or skyshine, which baby should have daily.

Table 9. *Day's Diet for the Older Baby (10 to 12 Months)*

Food	Calories	Protein	Minerals		Vitamins				
			Calcium	Iron	A	Thiamin	C	Riboflavin	D
		grams	*grams*	*grams*	*I.U.*	*micrograms*	*milligrams*	*micrograms*	*I.U.*
3 cups milk	510	24	0.864	0.00147	804	438	6	1,647	15
1 egg yolk	64	3	0.023	0.00155	500	75	0	62	50
6 halves of apricots	66	....	0.016	0.00182	1,200	22	1	26	...
½ cup scant tomato juice	24	1	0.006	0.00060	.....	.....	19	.....	...
1 tsp cod-liver oil	33	....	0.	0.	3,400 *	0	0	0	340 *
1 small carrot (strained)	22	....	0.023	0.00030	1,050	30	3	30	...
12 tbsp cooked oatmeal	150	6	0.022	0.00160	.....	180	0	35	...
1½ slices enriched bread	112	5	0.024	0.00036	.....	156	..	74	...
⅓ medium potato	33	1	0.005	0.00036	12	48	5	18	...
¼ apple	20	....	0.003	0.00017	32	19	2	13	...
1 tsp brown sugar	11	0	0.003	0.00008	0	.....	0	.....	...
	1,045	40	0.989	0.00831	6,998	968	36	1,905	405
Allowance for 1-year-old child weighing 21 lb	986	29–39	1.000	0.006	1,500	400	30	600	400

* Minimum values as stated in new and non-official remedies, 1941. (See labels.)

A baby, therefore, may take less of the foods than here suggested and still meet his allowance. On the other hand, if a baby is bigger, is taller, or is more active than the average for his age, he may want and need more food—a quart of milk in place of 3 cups and an extra serving of fruit juice or fruit sauce may meet this demand. The child's diet should not contain more than 1 quart of milk a day including what goes into foods. If baby is still hungry and he has had his full allowance of milk, more of the other foods in his diet that he likes and takes well should be included to make up his calories.

When Does Baby Get Unstrained Foods?

Foods are strained for little babies because the rougher part of the plant tissue, the cellulose of fruits, vegetables and cereals, takes up too much room in a baby's small stomach without adding food value. Cellulose may be irritating to the delicate membrane of the digestive tract and may tend to hurry food through the alimentary tract too fast, causing diarrhea.

At just what age, therefore, the cellulose can be left in baby's food depends: *first,* upon the size of his stomach; *second,* upon the keenness of his appetite—can he eat enough total food to give him the food values he needs for growth and development if his stomach is filled with cellulose? *third,* upon the condition of his bowels.

By the time baby reaches 1 year of age his stomach will hold about 8 ounces. If, therefore, his appetite is sufficiently good, so that he can get enough calories and other food values by taking this extra bulk; if it does not cause more than 1 or 2 medium-sized bowel movements a day; and if his weight is up to or above average, he may then be ready to try unstrained foods. At this age start unstrained food by giving him his cereal unstrained but well-cooked. If after a month baby seems to be taking this well with a healthy appetite and a good condition of his bowels, well-stewed unstrained fruit may be tried. After another month if he is still doing well, unstrained vegetables may be begun. Most babies are on unstrained foods by 1½ to 2 years of age. Remember always that it is better to be safe than sorry; therefore, changes should be made slowly. Watch the baby and let him be the criterion for further change.

Growing Up

Some day I shall be too old for a crib,
  Old for a pinafore, old for a bib;
Some day—and soon, at the rate that I've grown,
  I'll have a proper bed, all of my own.

FIG. 14. "Some day I shall be too old for a crib."

Some day I'll eat with a fork, not a spoon;
And these manly changes can't happen too soon;
But one thing I'd like to keep up, if I might—
Have Mother to tuck in my blankets at night!

From "The Rocking Horse," by CHRISTOPHER MORLEY
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REFERENCES

1. A. F. HESS, *Rickets, Osteomalacia, and Tetany,* Chapter 8, pages 246–249, Lea and Febiger, Philadelphia (1929).
2. K. BLUNT and R. COWAN, *Ultra-Violet Light and Vitamin D in Nutrition,* University of Chicago Press, Chicago (1930).
3. S. C. G. OELJEN and C. A. SHERER, The first application of the new-born infant to the breast, *Arch. Pediat.,* Vol. 50, pages 11–17 (1933).
4. C. G. GRULEE, H. N. SANFORD, and H. SCHWARTZ, Breast and artificially-fed infants; study of age incidence in morbidity and mortality in 20,000 cases. *Jr. Am. Med. Assoc.,* Vol. 104, pages 1986–1988 (1935).
5. R. A. DAFOE, Further history of the care and feeding of the Dionne quintuplets, *Can. Med. Jr.,* Vol. 34, pages 26–32 (1936).
6. A. CARREL, Breast-feeding for babies, *Reader's Digest* (June, 1939).
7. J. L. MORSE and F. B. TALBOT, *Diseases of Nutrition and Infant Feeding,* 2d Ed., Macmillan, New York (1920).
8. I. G. MACY, H. A. HUNSCHER, E. DONELSON, and B. NIMS, Human milk flow, *Am. Jr. Diseases Children,* Vol. 39, pages 1186–1204 (1930).
9. MARGARET MEAD, *Sex and Temperament in Three Primitive Societies,* Wm. Morrow, New York (1935).
10. H. DIETRICH, An analysis of a series of case records relative to certain phases of breast-feeding, *Jr. Am. Med. Assoc.,* Vol. 79, pages 268–270 (1922).
11. J. H. HESS, *Feeding and Nutritional Disorders in Infancy and Childhood,* F. A. Davis, Philadelphia (1930).
12. R. S. BIZAL, *A Study of Practices in Feeding Infants.* Results of a Survey of 657 Babies in Villages of New York State, 1930. Cornell University Agr. Exp. Sta. Bul. 610 (1934).
13. C. F. SHUKERS, I. G. MACY, B. NIMS, E. DONELSON, and H. A. HUNSCHER, Quantitative study of the dietary of the human mother with respect to the nutrients secreted into breast milk, *Jr. Nutr.,* Vol. 5, pages 127–139 (1932).
14. B. SURE, The lactation-promoting properties of cystine when added to casein diets, *Jr. Nutr.,* Vol. 22, pages 491–497 (November, 1941).
15. H. S. CARTER, R. E. HOWE, and H. H. MASON, *Nutrition and Clinical Dietetics,* Lea and Febiger, Philadelphia (1921).
16. H. E. DEEM, Observation on Milk of New Zealand women, *Arch. Disease in Childhood,* Vol. 6, pages 53–70 (1931).
17. Foreign letters, *3d Intern. Conf. Nutr., Jr. Am. Med. Assoc.,* Vol. 114, page 426 (1940).
18. R. G. DAGGS, The effect of cystine on human milk production, *Am. Jr. Obstet. Gynecol.,* Vol. 40, pages 457–460 (1940).

19. W. H. Jordan, E. B. Hart, and H. J. Patten, A study of the metabolism and physiological effects of certain phosphorus compounds with milch cows, *Am. Jr. Physiol.*, Vol. 16, pages 268–313 (1906).
20. L. E. Holt, A. M. Courtney, and H. L. Fales, The chemical composition of diarrheal as compared with normal stools in infants, *Am. Jr. Diseases Children*, Vol. 9, pages 213–224 (1915).
21. M. S. Rose, Racial food habits in relation to health, *The Sci. Mon.*, Vol. 44, pages 257–267 (1937).
22. Mothers in Ancient Sweden fined for refusing to nurse children. Note from Hygiensk Revy, *Jr. Am. Med. Assoc.*, Vol. 81, page 97 (1923).
23. A. M. Butler, The physiology of nutritional requirements, *Jr. Am. Diet. Assoc.*, Vol. 12, pages 23–33 (1936).
24. A. J. Carlson, *The Control of Hunger in Health and Disease*, University of Chicago Press, Chicago (1919).
25. M. K. Harper, *Findings from Correspondence Service in Infant Nutrition*, Thesis for degree of M.S., Cornell University (1932).
26. D. M. Maughan, *Findings from Resident Service in Infant Nutrition*, Thesis for degree of M.S., Cornell University (1933).
27. P. C. Jeans and G. Stearns, Effect of vitamin D on linear growth in infancy. II. The effect of intakes above 1800 U.S.P. daily, *Jr. Pediat.*, Vol. 13, pages 730–740 (1938).
28. G. von Bunge, Über die Aufnahme des Eisens in den Organismus des Säuglings, *Z. physiol. Chem.*, Vol. 13, pages 390–406 (1889).
29. H. M. M. Mackay, *Nutritional Anaemia in Infancy*, Medical Research Council, Special Series Report, 157, Majesty's Stationery Office, London (1931).
30. W. B. Cannon, *Bodily Changes in Pain, Hunger, Fear, and Rage; An Account of Recent Researches into the Function of Emotional Excitement*, D. Appleton, New York (1915).
31. R. A. Dafoe, Further history of the care and feeding of the Dionne quintuplets, *Can. Med. Assoc. Jr.*, Vol. 34, pages 26–32 (1936).

CHAPTER V

FIG. 1.

THE TODDLER TODDLES

Contents

A. Seeing the Child
B. Observable Symptoms of Good Nutrition
C. Points To Remember in Feeding the Pre-School Child
D. Daily Diet of the Pre-School Child
E. Introducing New Foods
F. Lack of Appetite
G. The Child with a Ravenous Appetite
H. The Older Pre-School Child
I. Eating between Meals
J. Do's versus Don'ts in Feeding the Pre-School Child
K. Other Factors Necessary to Good Nutrition

Seeing the Child

Now your child has reached the pre-school age. It is the age that makes people turn on the street to say, "Isn't he cute?"; the age at which the child is passed from person to person for admiration; the age at which he is often asked to show off for the benefit of the adult, "Tell Miss —— about Mary's little lamb"; the age when everybody notices him but few really see him. It is the age when the child has just passed babyhood, under the strict direction of a physician, but an age before he goes to school and comes under the scrutiny of the teacher, the health officer, and other school authorities.

It is the age when he is growing slowly physically but developing very fast mentally. He is learning much. Among other things he is learning to assert himself and to say "no." Instead of laughing it off with him or paying no attention to it, parents too often allow the child to refuse to do the things necessary for his development, or force him against his will to do everything. And when it comes to feeding children, these methods are equally bad. No, many parents do not really see the child. They know he is cute. They think he is the smartest baby there is. That is perfectly natural. But he may be pale, he may tire easily, he may not want his food, he may not sleep well; and this may be allowed to go on and on until the child is really sick enough to be taken to a doctor.

Mothers can put their babies on the same schedule, can use the same feeding interval, can give the same food, and seem successful in doing it. But when the baby becomes a child and begins to toddle he begins to express himself as an individual. Isn't he beginning to walk alone? Isn't he trying to talk? Does he not want to feed himself and to put his own shoes on and off? Of course he does, and the more he is allowed to do these things, even though slowly and awkwardly, the better it will be for the parent and for him. At this age, particularly, he can stand a good deal of letting alone, a good deal of opportunity to do things for and by himself, a good deal of just being allowed to grow, so to speak, like Topsy.

How can parents properly judge the child? Frequently parents are so close to their child that they become calloused to his condition. They should get far enough away from him to see him. Watch him as he plays with other children of his age (Fig. 2). Does he play happily, have a sparkle of enjoyment, and get around well? Or does he seem listless, tire easily, and usually seem cross? Is he the same height as other children of his age? Is his weight proper for his height? Is his color good—not from exercise or sleep, but normally, when quiet, relaxed, calm, and not overheated? How is his muscle and bone development? Does he naturally stand straight without being told to? Has he good muscular coordination in play? All this will help you really see your child.

FIG. 2. Well-nourished children enjoy active play.

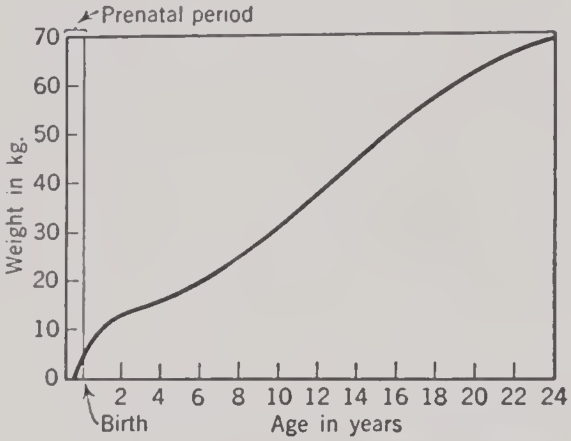
Observable Symptoms of Good Nutrition

Height and weight, as evidences of development, are easily measured. Height-weight-age tables are available for study. (See Appendix, page 368.) When studying these tables, parents should remember that they need not always be disturbed if their children's height and weight are not average according to these tables. Even though their youngsters do not "fit" the table—that is, are not "average"—they may be developing properly. Each person develops and grows according to his inherited tendencies. If the mother's family and the father's family are all tall, they have a perfect right to expect tall children. If one or the other is small then, perhaps, the child may be small.

The following rules are helpful in judging height and weight according to the individual child. A child normally increases his birth weight threefold at 1 year of age, fourfold at 2 years of age, and sevenfold at 6 years of age. For example, a baby weighing 7 pounds at birth will normally weigh about 21 pounds at 1 year of age, 28 pounds at 2 years of age, and 49 pounds at 6 years of age. During his pre-school years from 2 to 6, he will normally gain weight on an average of about 5 pounds a year, or ¼ to ½ pound (4 to 8 ounces) a month, and will grow in height on an average of 3 inches a year or ¼ inch a month.

Compare this gain with that of the infant who gains not 5 pounds a year but almost 3 times that, or 14 to 15 pounds a year; who increases in height not 3 inches a year but about 3 times that, or 9 to 10 inches. Note how in the weight chart (Fig. 3) the line shoots almost straight up until 1 year of age, then flattens out until almost 6 years of age, and then spurts up again.

Gains in height and weight are not regular throughout the year. Children tend to increase in weight most rapidly in autumn and winter, and to increase in height most rapidly in late spring and summer. Also, great differences in types of body build naturally occur. Children may be grouped roughly into three weight classes—light, medium, and heavy—depending upon the proportions of bony framework to other tissues and to muscular development. Differences in the body build are the result partly of heredity and partly of the individual's life history.



Courtesy of Norman C. Wetzel

FIG. 3. Average weight curve of young people of both sexes. Redrawn from *Jr. Ped.*, Vol. 4, page 465 (1934).

That thinness seems to be a family characteristic, however, does not mean that all the children of the family will necessarily be thin; nor will a man's children all be short because he happens to be short.

Furthermore, a child's body may grow but he may not develop in other ways. Or he may develop mentally but not physically. Sometimes physical growth hides the lack of development of functional power and brain activity; then some one may say of a child, "He is a healthy little animal—slow in some ways, but a perfect wonder to look at." Sometimes keen and rapid mental development overshadows the lack of proper body growth; then some one may say, "That child is all brain—not very strong, but mighty bright." Such remarks do not recognize the fact that mental, social, and physical development are all important, and that it is desirable to build a strong body to keep pace with mental activity.

Tangible evidence of growth is observable also in bones and teeth. During the pre-school age the soft bones of the body harden into the true bony structure, and they elongate rapidly. At 6 years of age, the jaw bones should be so developed as to give space for 24 teeth. All the baby or deciduous teeth should be present at that age and the 6-year molars should be either present or coming through. Although great variation occurs in the age at which teeth are cut, a healthy child may be expected to have 6 teeth at 1 year of age, 12 teeth at 1½ years of age, 16 teeth at 2 years of age, 20 teeth at 2½ years of age, and 24 teeth at 6 years of age. The last 4 are permanent molars, behind the posterior molars of the first dentition. At 6 years of age, a child begins to shed some of his first teeth. If well nourished, he does not go through the snaggle-tooth age, but the permanent teeth simply push out the temporary teeth so that there is usually something in "that hole."

The individual child's growth and development should be watched, and he should be fed accordingly. One may assume that growth and development are progressing normally if he appears to be growing and to be feeling, eating, and sleeping well; if he acts happy; if he is physically and mentally alert; if he has a good color, clear skin, and flesh that is springy rather than flabby to the touch; and if he has good elimination.

Points to Remember in Feeding the Pre-School Child

Pre-school children, well fed from infancy as well as in pre-school years, like their food and are a joy to feed. For instance, one of them, under the observation of one of the authors, would break out occasionally with "Good spinch," or "Good 'taters." This child was well-cared for and well-fed from before birth and therefore had no food difficulties.

There are several facts to remember when feeding pre-school children.

1. Gains in weight are slow in pre-school years.

2. The child's stomach at this age is still small (it holds but 8 to 9 ounces at 1 year of age). Maybe if he is not gaining as he should, some or much of his food should still be strained so his little stomach will not have to hold too much bulk until he is 1½ or 2 years of age. Also, food given him should be such that it leaves the stomach quickly; therefore he should have a little fat, including a little butter and one teaspoon of cod-liver oil, with no fried foods, no pancakes, no doughnuts, and no chocolate in any form, since all of these retard passage of food from the stomach. Protein is next to fat in its ability to retard the passage of food from the stomach. Therefore, for the child who has little appetite, it is well to keep milk at 2 or 3 cups as a maximum, including what goes in his food, and give egg yolk without the egg white until appetite increases. It may even be well until appetite increases to begin all meals with about ¼ cup of fruit juice or tomato juice in order to stimulate the flow of gastric juice.

3. The child is still growing—teeth, bones, muscle—(see page 212) and, since his stomach is small and he can take little food, every food given should contribute, if possible, protein, minerals, or vitamins as well as energy. For example:

> (*a*) White sugar gives only energy; therefore brown sugar and molasses should be used whenever possible in place of white sugar. And sweets, including candy, should be used only in small quantities as a dessert. The candy used as dessert should be molasses candy, Parisian sweets, or stuffed fruits, and not lollypops, suckers, or concentrated sugar candies. If one starts this program, and the whole family works together on it, a child soon is content to think of candy as a dessert. Furthermore, a well-fed child does not actually crave candy. If a child does crave candy, find out what is wrong with his feeding.
>
> (*b*) Fats, such as lard, Crisco, olive oil, and Spry, give only energy. Butter, cream, and fish oils give vitamins as well. Never give pre-school children foods cooked with the first type if they can be avoided.
>
> (*c*) Bacon contributes very little but energy to the diet. We use it sparingly, well cooked, to give flavor to liver, that highly nutritious food which all children should learn to eat. If it is a choice between bacon and ham, a small piece of well-cooked ham may be given the pre-school child because of its high thiamin (vitamin B_1) content.

Bones, teeth, and muscle are all aided by the use of milk in the pre-school child's diet. The amount needed daily, however, has been a subject of much controversy. Many physicians are finding among pre-school children who are brought to their attention that much of the difficulty is due to lack of appetite. According to Aldrich, 60 to 80 per cent of our well-cared-for children of today have to be urged to eat. [1] This, of course, should not be the case. A healthy human animal, like any other animal, should have a healthy appetite. Many physicians believe that this "hunger strike" which they are finding is attributable to the quart of milk a day. Milk, being liquid, usually goes down so easily. Moreover, the importance of a quart of milk a day for children has been stressed so greatly with parents that they think they are doing their duty for their child nutritionally if they give him this quart of milk a day even though he eats little or nothing else, is peevish, irritable, pale, constipated, has eczema, and tires easily. Important as milk is to the child's welfare, it is necessary to study the child before applying the "quart rule."

Although the feeding of a healthy young child is easy when it is possible to build the diet on a foundation of 1 quart of whole milk a day, there are children who do better on less. For an average child 1 to 3 years old, 1 quart of milk practically meets the needs of the body for protein (which helps to build muscle), for calcium and phosphorus (which help to build bones and teeth), for fat (which helps furnish energy), for vitamin A (so necessary for proper eye development and for resistance to disease), and for thiamin (vitamin B_1, so necessary for proper functioning of the digestive and nervous system). (See Table 1.)

One quart of milk however will not furnish enough iron, which is so necessary for red blood-cell formation and the lack of which is so often responsible for the child's pale color and lack of energy. It is the hemoglobin, the iron-containing compound of the red blood cells, that carries the oxygen of the air to the tissues, where it is used in the process of oxidation of nutrients to produce energy. This diet of 1 quart of milk in inland countries will be low also in iodine, needed for the proper functioning of the thyroid gland. Pasteurized milk will be low in vitamin C, that vitamin so important for healthy teeth and gums and to help wounds to heal when baby gets hurt. It is somewhat low in niacin, the pellagra-preventing vitamin. One quart of milk may also be low in vitamin D (the sunshine vitamin) and may have too small an amount of riboflavin, which is associated with healthy skin and helps to prevent lesions at the angles of the mouth. In addition to all this, a quart of milk a day will not furnish these little toddlers with enough energy to help them to maintain their weight and to keep them going all day long.

The child will continue, we hope, to get each day, for vitamin C, an orange, either plain or as juice, or tomatoes in some form, will be out in the sunshine daily or continue to have a teaspoon of cod-liver oil or its equivalent in vitamin D, and will get iodine from some other source as sea fish or iodized salt if not supplied in the oil. This should be supplemented by an additional small serving of whole cereal and ½ slice of enriched bread for the younger children, or whole-wheat bread for the older preschool child, for breakfast; a small serving of meat or fish, a serving of potato and one other vegetable for dinner; an egg yolk, ½ slice of whole-wheat or enriched bread and a small serving of fruit sauce for the evening meal. Thus the iron, riboflavin, and calories will be made up, especially if the meat is liver at least once a week, if the fruit sauce is apricots once or twice a week, and if the child takes all this food.

Milk is the principal source of calcium for children. But recently a number of nutritionists, working with children, showed that a child can meet his calcium requirement with 1 pint of milk a day, especially if he has been well fed with milk in infancy and if he is having an otherwise good diet.

Table 1. Comparison of Nutritive Value of One Quart of Milk and the Food Requirements of a One-Year-Old Child

	Fluid Ounces	Protein	Fat	Carbohydrate	Calories	Calcium	Phosphorus	Iron	Vitamin A	Thiamin	Riboflavin	Niacin	Ascorbic acid	Vitamin D
		grams	*grams*	*grams*		*grams*	*grams*	*mg.*	*I.U.*	*I.U.*	*mg.*	*mg.*	*mg.*	*I.U.*
Food value of 1 qt of whole Holstein or Ayrshire milk	32	32	39	49	675	1.17	0.91	2.3	2,300	165	0.2–0.7	4.9	7	20
Daily food requirement for an average baby, 1 year old, weight 21 lb	42	28.5–38	38	105	953	1.0	1.0	6	1,500	133	0.6	4	30	400–800

Source of data:
Editorial: Distribution of nicotinic acid in foods, *Jr. Am. Med. Assoc.*, Vol. 117, page 197 (1941).
Nutritive Values of Average Servings of Common Foods. (See Appendix.)
Recommended daily allowance for specific nutrients suggested by the Committee on Foods and Nutrition, National Research Council.
M. S. Rose, *Foundations of Nutrition* (1938).
H. C. Sherman, *Chemistry of Foods and Nutrition* (1941).
J. H. Hess, *Feeding and Nutritional Disorders in Infancy and Childhood* (1930).

The experimental work to date on this subject includes the work of Sherman and Hawley who studied 12 children, ages 3 to 13 years, and found that, while they got positive calcium balances upon an intake of 0.45 gram of calcium per day in all these children, they got increased calcium retentions on 0.75 gram, and 1.00 gram of calcium per day was beneficial but not essential for all children. One quart of milk gives approximately 1 gram of calcium. This conclusion applied to children generally, not pre-school children, since many of the children in this experiment were beyond pre-school age. The study was based on children in an orphan's home. [2]

Daniels and co-workers, on the other hand, studied a large number of pre-school children, 3 to 5½ years of age, and concluded that children of this age vary in their need for calcium, but that a daily intake of 1 pint of milk is sufficient for normal children, while a larger amount may be needed for older children or for those who have less calcium stored in the body. [3] Outhouse, studying 5 healthy pre-school children, also came to the conclusion that a pint of milk was sufficient for the calcium need of these children. [4] Leitch, in a study of the literature, has estimated the calcium requirement for various ages and states that two-thirds of this amount should be met by milk. The National Research Council (see Appendix) suggests 1 gram of calcium per day throughout the pre-school years. This can be met easily, as shown in Table 4, by 3 cups of milk a day.

Daily Diet of the Pre-School Child

Table 2 shows the foods needed daily by a pre-school child, how they should be prepared, and the reasons for including them in the diet. Be sure there is more than one reason for including each food.

If baby needs all these foods, how are they to be included in his diet? About the time the baby reached a year of age he weighed 20 to 21 pounds and met his requirement on a diet of three meals a day. (See page 205.) A child's daily food supply is increased gradually from these minimum amounts as he wants and will take more solid food. The food is, however, strained until he is taking well above the minimum amount.

Table 3 shows a minimum diet to which meat or fish has been added. Once a week the meat should be liver. Gradually change this diet, as shown in Table 4. The egg yolk becomes a whole egg, another vegetable is included at night, if the child eats well. Dessert at noon may be a milk and egg dessert if the child will take it after he has eaten the other food.

Table 2. The Daily Diet of the Pre-School Child

FOODS NEEDED	HOW THEY MAY BE USED	REASONS FOR INCLUDING
Milk (whole) One pint to 1 quart daily; never more than 1 quart a day including that used in cooking and on cereal	The milk may be served as a beverage; on cereals or milk toast; with vegetables; in soups; in simple desserts, such as custard, junket, rice, tapioca, and bread puddings, homemade ice cream, and milk sherbet. If the milk is from Jersey or Guernsey cows, a part of the cream may be removed. If milk is used in food preparation, the child need not drink his full daily portion. If milk is bought raw it should be boiled or pasteurized at home. If skim milk is used one should be sure that the child gets 1 teaspoon of cod-liver oil or other high vitamin A food daily.	1. Absolutely necessary to supply *calcium* and *phosphorus* for healthy bones and teeth and for normal growth. 2. Excellent source of *protein* for growth, for building and repair of muscles, and for well-being of the whole body. 3. Whole milk is a good source of *vitamin A* needed for growth, health of mucous membranes, and for the eyes, and possible resistance to infection. 4. A good source of *thiamin* (vitamin B_1), necessary for growth, appetite, health of nerves and for prevention of constipation. 5. An excellent source of *riboflavin*, necessary for oxidation processes in the body tissues and to help prevent cracked sore lips at the corners of the mouth. 6. A good source of *niacin* (nicotinic acid) which prevents pellagra and its symptoms of sores on skin, digestive and nervous symptoms.
Egg One daily, or at least one yolk daily	Eggs may be coddled, soft cooked, hard cooked, poached, scrambled, or cooked in desserts, such as custard. The yolk without the white may be given. The white is not necessary in a child's diet and not even advisable until he is 2 years of age, as it furnishes only riboflavin and protein (muscle-building material) which in a well-planned diet is usually already high. If meat or fish is not given, 2 eggs may be used daily; for the younger pre-school child, 2 yolks only.	1. Excellent source of *protein*. 2. A good source of *iron* needed for hemoglobin formation. It helps to prevent anemia. 3. A good source of *vitamin A*. 4. Provides some *thiamin* (vitamin B_1). 5. An excellent source of *riboflavin*. 6. A good source of *vitamin D* which helps to prevent rickets. 7. A good source of *phosphorus*.

Table 2. The Daily Diet of the Pre-School Child (*Continued*)

FOODS NEEDED	HOW THEY MAY BE USED	REASONS FOR INCLUDING
Meat, fish, or poultry * 1 serving daily	Meat, poultry, or fish daily is recommended. The serving should be small. Liver, beef, and poultry are preferable to other meats. Seafish is preferable to fresh-water fish. Seafood and such organs as liver, heart, and sweetbreads have been found to contain the vitamins and iron and could well be given once a week. Meat should be broiled, stewed, or roasted, and chopped when baby is 1 year of age, graduating to pieces to chew at 1½ to 2 years of age. If bone is given to chew upon during the latter part of infancy, the child will chew meat better.	1. Excellent source of *protein.* 2. Good source of minerals, especially *iron* needed for healthy blood. Liver, kidneys, tongue, and oysters are especially high in iron. 3. Contains *thiamin.* Liver is an excellent source of *all vitamins.* 4. Sea fish and oysters contain *iodine* to prevent goiter. 5. Fat fish contains *vitamins A* and *D.* 6. Lean meat is a good source of *niacin* (nicotinic acid). 7. Lean meat is a good source of *riboflavin.*
Vegetables * Two servings of different vegetables daily in addition to one serving of potatoes daily (green vegetables should be used at least four times a week)	Any properly cooked vegetable may be given. A vegetable should be cooked until just tender but not discolored. Corn and dried beans should be put through a sieve. Such vegetables as peas, onions, string beans, and cabbage should be chopped fine or mashed for the two-year-old. Vegetables should be served with a little butter, cream, or milk and salt, but no other seasoning. Raw vegetables, such as chopped lettuce, chopped cabbage, chopped or grated carrots, strips of tender young carrots, tender young turnips, or celery hearts, are good for the child at the noon meal occasionally.	1. Provides minerals and vitamins necessary for growth, and for regulation of body processes. Tomatoes and green and yellow vegetables are high in *vitamin A* and *thiamin.* The green vegetables contain fair amounts of *calcium* and *iron* as well. Green vegetables and tomatoes are good sources of *niacin* (nicotinic acid) and green vegetables are also a good source of *riboflavin.* Tomatoes, cabbage, peppers, and potatoes are good sources of *vitamin C.* 2. They supply *cellulose* (roughage), *organic acids,* and *minerals* to help with elimination. 3. Potatoes are an economical source of *energy* and a good source of *iron* and *vitamin C.*

Fruit * Two servings of different fruits daily	Any cooked fruit may be used. Only the juice and strained pulp of berries should be given to the one-year-old. Mild, ripe fruits, such as bananas, apples, pears, and peaches, may be given raw occasionally. It is desirable to scrape them for the one-year-old. An orange, lemon, grapefruit, tomato, or the juice of one of these fruits, should be given every day. Grape juice is well liked by most children and is an acceptable drink. Dried fruits—peaches, apricots, dates, or prunes—may be served raw, canned, or cooked for dessert. Ripe melons may be given in small amounts to the healthy pre-school child. Parents should guard against giving too much ripe raw fruit because of the possibility of causing diarrhea. In beginning any new ripe fruits, the parents should begin with small amounts and watch the child's bowels for too laxative an effect.	1. Citrus fruits and tomatoes, cantaloupe and strawberries are our best sources of *vitamin C*, necessary for healthy teeth, for health of blood vessels, and for the prevention of scurvy. 2. Fruits provide *vitamins A*, *B*, *C*, *riboflavin*, and *iron*, as well as other minerals, depending upon the choice. Apricots are especially high in *iron*. Figs, dates, and prunes are good sources of *iron*. 3. Because of the content of *organic acids*, *minerals*, and *cellulose*, fruits have good laxative effect.
Breakfast cereal * At least one serving of a whole-grain cereal or its equivalent in whole-grain bread daily	Any well-cooked cereal may be used. Ready-to-eat cereals may be used occasionally. The dark-colored whole cereals are preferable to the white refined cereals. Cereals may be used at morning and evening meals in late infancy, but should be replaced by other food in one of these meals by the time the child is 1½ years of age. Bread, hard toast made from bread, or zwieback may be part of each meal. A small amount of butter may be put on the bread, with or without fillings of chopped fruit, meat, vegetable, egg, peanut butter, as in sandwiches. Enriched bread may be used as part of the bread intake.	1. An economical source of *energy*, needed for activity and to maintain the right weight. 2. Whole cereal is a good source of *thiamin* (vitamin B_1), *niacin* (nicotinic acid), and iron. 3. Provide fair amounts of *protein*, though not of best quality. 4. Enriched bread has *thiamin* (vitamin B_1), *niacin* (nicotinic acid) and *iron*, but not the cellulose, restored. It is not as valuable a food, however, as whole-wheat bread.

Table 2. *The Daily Diet of the Pre-School Child* (*Continued*)

FOODS NEEDED	HOW THEY MAY BE USED	REASONS FOR INCLUDING
Dried legumes	Navy beans, dried peas, and dried lima beans are usually not used, unless strained, until the latter part of the pre-school years.	Dried legumes are good sources of *protein*, *thiamin* (vitamin B_1), *niacin* (nicotinic acid), and *iron*.
Butter	A child at this age often likes to spread his own bread. Avoid too much butter by giving him his small pat of butter on his plate or bread and butter plate and his butter spreader or other small knife to spread with.	1. Good source of *vitamin A*. 2. Good source of *energy*.
Cod-liver oil † One-fourth to one teaspoon daily or its equivalent (see Table 7, chapter IV)	Cod-liver or other fish oils may be given regularly in the middle of the morning, after meals, or before going to bed. One teaspoon of cod-liver oil or its equivalent is advisable for most pre-school children. Some products furnish only vitamin D; hence vitamin A and iodine must be supplied otherwise in the diet, if these are used. If cod-liver oil or some substitute is not available, a fat fish (salmon, sardines, or herring, fresh or canned) should be given once a week.	1. Provides *vitamins A* and *D* necessary for bone and tooth formation and for health of the mucous membranes. 2. Cod-liver oil provides *iodine*, necessary for prevention of goiter, for growth, and for well-being.

Water One cup or more daily	The amount of water a child takes depends upon the weather, the temperature of the room, and the child's activity. A child will drink more water if the weather is warm, if he is more active than usual, or if he is in a warm room. Water, cool but not iced, should be made available to children both morning and afternoon and at meal time, but it should not be forced upon them. All foods contain water. Milk is more than two-thirds water.	Water is necessary in all body processes. It assists in regulating body *temperature*, aids *digestion*, *elimination*, and *circulation*, and is given off in *respiration*. Hence it must be supplied.
Sweets Use only as desserts except that fruits, fresh or dried, may also be used between meals	Fruits and simple desserts, such as those listed, provide enough sweets as a rule. Plain cake and simple cookies may be given now and then. A small piece of molasses candy may be given occasionally as dessert, although dried or fresh fruits are better. As the child grows older and is more active, he may take both fruit sauce and cookie or plain cake for dessert. Desserts made of egg and milk or fruit make the best desserts for children	White sugar, some syrups, lollypops, stick candy, other hard candies, and soft drinks give nothing but energy. Do not use them. Brown sugar and molasses and maple sugar give *iron* and some *calcium* as well as *energy*. Use where sugar is needed. Molasses is the best. Dried fruits give all that molasses gives but also give some *vitamins*. Use fruits, fresh, dried, canned, or as juice, in place of more concentrated sugars, candies, and syrups when possible.

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* A serving for the young child is 1 to 8 level tablespoons, depending on the age and activity of the child.

† Practically all sea-fish oils have been found to contain the same helpful vitamin D as cod-liver oil. The white fishes, like cod and halibut, have these qualities deposited in the liver, but fat fish, like salmon, herring, and sardines, have them throughout the body. Therefore, if cod-liver or halibut-liver oil is not given, it is well to serve salmon or similar sea fish at least once a week. Oil from canned salmon may be used instead of cod-liver oil. The body will make its own vitamin D if exposed directly to the sunshine.

Table 3. Minimum Diet for the One- to Three-Year-Old Child

Food	Calories	Protein	Minerals		Vitamins				
			Calcium	Iron	A	Thiamin	C	Riboflavin	D
		grams	*grams*	*grams*	*I.U.*	*micrograms*	*milligrams*	*micrograms*	*I.U.*
Orange juice, ⅖ cup	55	1	0.019	0.00020	200	90	45	15	. . .
Oatmeal, ⅓ cup	44	2	0.007	0.00053	. . . . .	60	0	12	. . .
Milk, 3 cups	510	24	0.864	0.00147	804	438	6	1647	15
Bread, 1½ slices	113	5	0.024	0.00036	. . . . .	156	. .	74	. . .
Butter, 1 tsp	33	0	0.001	0.00001	104	. . . . .	. .	. . . . .	3
Cod-liver oil, 1 tsp	33	0	0.	0.	3,400	0	0	0	340
Salmon, 1 tbsp	17	3	0.008	0.00016	41	. . . . .	. .	28	100
Potato, ½ medium	50	2	0.007	0.00054	18	72	8	27	. . .
Chard, 2 tbsp	9	0	0.038	0.00116	3,375	. . . . .	14	34	. . .
Egg, 1 yolk	64	3	0.023	0.00155	500	75	0	62	50
Fruit sauce or ½ apple	40	0	0.007	0.00034	64	39	5	26	. . .
Brown sugar, ½ tbsp	17	0	0.004	0.00011	0	. . . . .	0	. . . . .	. . .
Total	985	40	1.002	0.00643	8,506	930	78	1,925	508
Allowance for 1 to 3 years	850 to 1,200	40	1	0.007	2,000	600	35	900	400–800

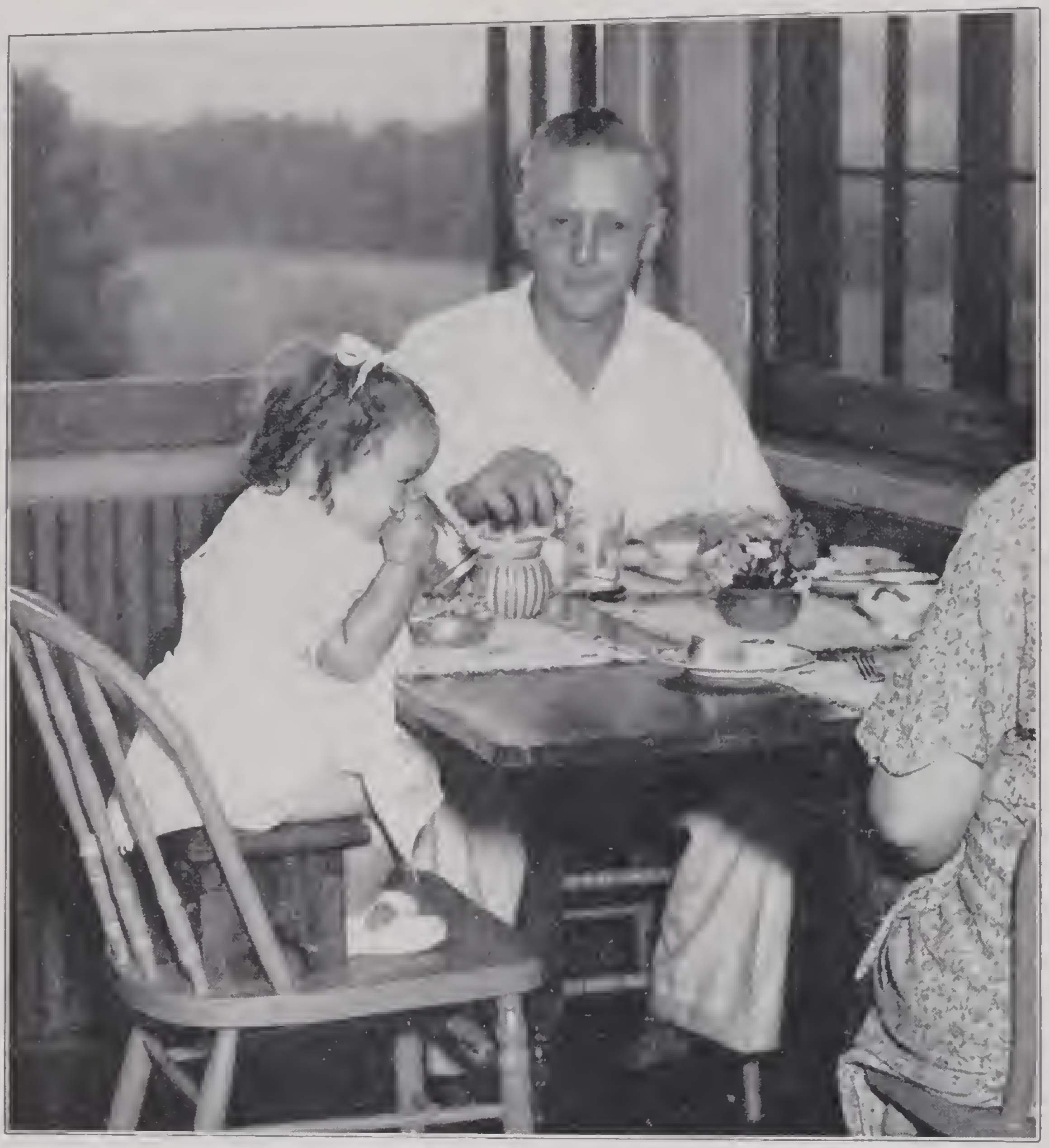

FIG. 4. Marilyn sits comfortably on an improvised seat at the table. If no child's chair is available, try to make your little guest comfortable with support for her feet.

One might expect this child at 3 years of age to take three daily meals about as follows:

Breakfast

Sections or juice of 1 orange or ½ cup tomato juice or sections or juice of ½ grapefruit
¼ to ¾ cup of cooked whole cereal
¼ to ½ slice of bread or toast of "enriched" bread or whole-wheat bread with a little butter
1 cup of milk

FIGS. 5 and 6. Children should be

Midmorning

1 teaspoon of cod-liver oil or its equivalent in vitamin D (see page 184)

Dinner

1 to 6 tablespoons of meat or fish

½ or 1 small baked or boiled potato with a little butter or 1 to 4 tablespoons of mashed potato

1 to 6 tablespoons of vegetable with a little butter

¼ to 1 slice of whole-wheat or enriched bread (little butter)

1 cup of milk

½ or 1 baked apple, without skin, or 1 to 8 tablespoons of fruit sauce or begin meal with ¼ cup fruit juice or tomato juice and use

1 to 8 tablespoons of baked custard, tapioca, or rice custard, junket, or boiled custard for dessert

Supper

1 egg (yolk only, if poor appetite)

½ to 1 slice of whole-wheat or enriched bread with a little butter

1 to 4 tablespoons of vegetable with a little butter

½ to 1 baked apple, without skin, or

1 to 6 tablespoons of fruit sauce

1 cup of milk

brought in for quiet play before meal time.

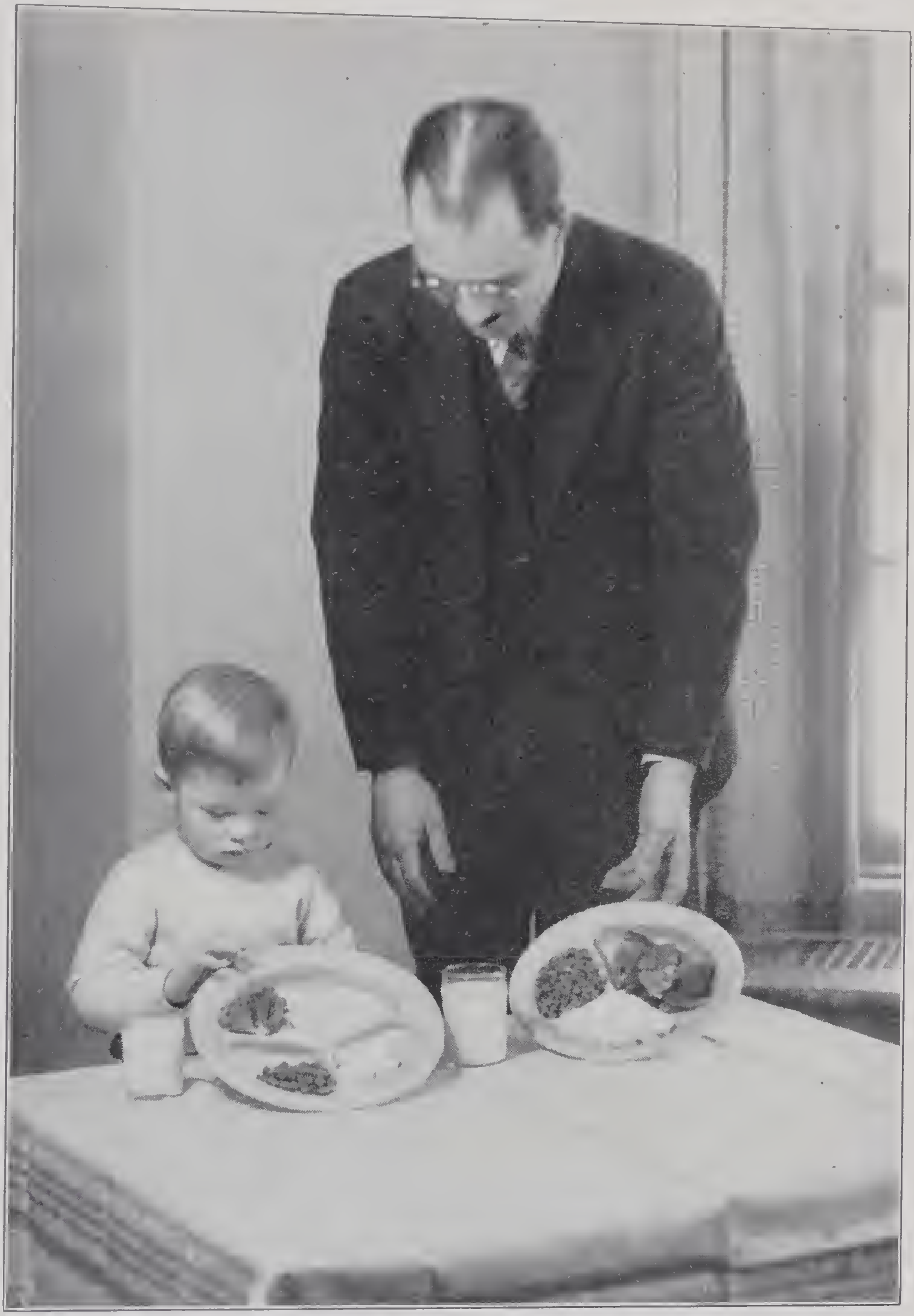

FIG. 7. Donnie's portion of food is much smaller than Dad's.

Table 4. Day's Diet To Meet the Nutritional Allowance of the Three-Year-Old Child

Food	Calories	Protein	Minerals		Vitamins				
			Calcium	Iron	A	Thiamin	C	Riboflavin	D
		grams	*grams*	*grams*	*I.U.*	*micrograms*	*milligrams*	*micrograms*	*I.U.*
Orange, 1 medium	75	1	0.039	0.00080	525	117	85	.....	...
Oatmeal, ½ cup	67	3	0.011	0.00080	.....	90	0	17	...
Milk, 3 cups	510	24	0.864	0.00147	804	438	6	1,647	15
Bread, enriched, 1½ slices	113	5	0.024	0.00036	.....	156	..	74	...
Butter, 1 tbsp	100	0	0.002	0.00003	312	.....	..	.....	10
Cod-liver oil, 1 tsp *	33	0	0.	0.	3,400	0	0	0	340
Salmon, 1 tbsp	17	3	0.008	0.00016	41	.....	..	28	100
Potato, ½ medium	50	2	0.007	0.00054	18	72	8	27	...
Spinach, 1 tbsp	3	0	0.010	0.00033	3,125	15	9	47	...
Egg, 1	80	7	0.031	0.00155	500	75	0	165	50
Vegetable (small carrot), 1 tbsp	23	1	0.023	0.00030	1,050	30	3	30	...
Fruit sauce, 2 tbsp or 1 apple	80	1	0.014	0.00068	128	77	9	51	...
Brown sugar, 1 tbsp	33	0	0.007	0.00023	0	.....	0	.....	...
Total	1,184	47	1.040	0.00725	9,903	1,070	120	2,086	515
Three-year-old allowance	1,200	40	1	0.007	2,000	600	35	900	400–800

* Amounts vary with kind used.

Since the amounts given in Table 3 nearly meet the allowances of a three-year-old child, mothers should work up gradually to larger amounts of these same kinds of food only as the child takes it well (Table 4). These figures are the amounts needed to feed an average three-year-old child adequately. A child taller than the average for his age and more active will want more of these foods. After he has eaten this much at each meal, let him select what additional quantity he wants from these same foods.

On days when the meal includes something tart such as fruit, tomato juice, or sliced, baked, or stewed tomatoes, the dessert might be custard (baked, boiled, or frozen) or a custard pudding like rice or tapioca.

A study of our nursery-school children over a period of 2 years seems to show that the two- to four-year-old children at the noon meal usually ate more than enough to meet one-third of their minimum daily requirement. Rarely did a child eat less than one-third of his minimum requirement. Occasionally a child took 5 times as much as this. [5 and 6]

If a child is still learning to like a food, ½ to 1 teaspoon may be all that he will be given until he has learned to like it. Avoid the mistakes of pushing food too fast. Never force a child to eat.

It should not be necessary to prepare separate meals for the pre-school child. He will require less total food than the adults and occasional substitutions but not entirely separate meals. The following menus were sent to us for criticism:

FAMILY	TWO-YEAR-OLD JOAN
Breakfast	
Hot cereal	Hot cereal
Soft-boiled eggs on toast	Bacon
Coffee	Banana
	Toast
	Milk
	Midmorning
	Orange juice—cod-liver oil
Dinner	
Pot roast with	Rare beef—carrots
Carrots, onions, tomatoes, and potatoes	Mashed potatoes
	Graham bread
Apple pie	Milk
Lunch	
Tomato soup—crackers	Coddled egg
Macaroni with cheese	Cream cheese on graham bread
Peanut butter	Applesauce
Cookies	Milk

It seems not only unnecessary but also not as good for the child or the family to have the mother spend so much time preparing separate food for her two-year-old. Joan might better have had a soft-boiled egg for breakfast with the family in place of the bacon, since it is well to keep the fat content of the pre-school child's diet low. At noon the pot roast and vegetables could have been served to Joan rather than preparing separate meat and vegetables for her. Joan might also have had pie filling for dessert. If she had an egg for breakfast, Joan might have had the tomato soup with the family for lunch. It would be just as well to omit the cream cheese as well as the peanut butter for Joan because of the high fat content.

Introducing New Foods

Since food habits which affect the child's health throughout life are formed early, it is important to have the child learn to like the foods that he needs for proper growth and good health. Hence only these foods should be given and they should be prepared and served simply but attractively.

Some mothers make the mistake of mixing foods or flavoring them in order to get a child to like them; for example, adding too much butter to vegetables, chocolate to milk, and making custard or pudding rather than giving egg as egg. Although custards and puddings are acceptable foods, the child should learn to eat egg as egg. He should learn to like the natural flavor of vegetables and plain milk.

Any discussion of food likes and dislikes should be avoided in the presence of children, and good food habits among the older members of the family should be cultivated because children are quick to imitate their elders. Make meal time a happy time.

All new and unfamiliar foods should be introduced into the child's diet gradually, beginning with small amounts of about ½ teaspoon and increasing the amount as the child becomes accustomed to it. Only one new food should be added at a time. Vegetables and other foods that are not yet liked by the child should be served in simple but attractive ways. Vegetables, for example, may be lightly buttered, creamed, or served in soups. Those that are originally sweet, such as peas, carrots, and beets, may be slightly sweetened again before serving to bring back the sweetening lost in cooking. To do this, after the vegetable is cooked and the water drained off, ½ teaspoon of sugar may be added to the whole amount for the family meal. Disliked vegetables or other disliked foods should be served in very small amounts, from ½ to 1 teaspoonful each time until the child acquires a liking for them. Pushing the use of any food too fast may result in permanent dislike of that food.

A six-year-old of our acquaintance liked and ate everything but cabbage. Because the child had not yet learned to like cabbage, his servings were very small, ½ to 1 teaspoon, which was always eaten but with no expression of enjoyment and no request for a second helping. One night this six-year-old was unwittingly left at the mercy of his sixteen- and eighteen-year-old brothers to be fed an evening meal that included scalloped cabbage.

When the aunt with whom they were living returned from a meeting at 9 P.M., the little fellow was in bed. But these older brothers met her with glee in their eyes as they exclaimed, "Oh, Aunt Mary, we got Jim to eat cabbage." "That's good," she replied. "Yes," said the oldest boy, "we gave him his part—one-third of that dish (a family dish) of cabbage—and told him he would have to eat all that before he got anything else to eat. While we ate, he sat there and cried. We finished our dinner and then locked him in the dining room with that plate of cabbage. He screamed and yelled for one-half hour or more, but we paid no attention. Finally, he said he had emptied his plate so we gave him the rest of his dinner and he went to bed." The aunt's only reply was, "How would you have liked that, Roger, if I had done that to you with codfish?" and turning to his brother, "Or to you, Gordon, with oysters?" She knew these were the foods most disliked by these two boys.

Nothing more was said that night. But the next morning after the older boys had left for college, Jim began telling his story with, "You know, Aunt Mary, my brothers were awfully mean to me last night." "Were they, Jim?" she asked. "Yes," he replied, "they locked me in the dining room with a big plate of cabbage and told me I couldn't get out until I ate all that cabbage. At first I screamed and yelled and kicked the door. Then I thought to myself, 'Jim, that's silly'; so I opened the window, threw out the cabbage, and told my brothers I had emptied my plate."

The sequel to this story is that to this day, though Jim has learned to eat all foods and never complains about any of them, if cabbage is served two days in succession he asks, "Why do we have to have cabbage today when we had it yesterday?" Yet he is particularly fond of broccoli, which is somewhat similar in flavor, and would probably eat it daily.

If both liver and fat fish were included once a week in a child's dietary and he got out of doors regularly one hour each day, the minimum diet suggested for him on pages 224 to 227 would meet the allowances suggested for him by the National Research Council (see Appendix). He could then select the rest of his calories from any of these foods. Though little research has been done on the feeding of infants and pre-school children, this council has summarized what has been done and has given us these figures.

There should be no fighting, no crying, no fretting or worrying on the part of either the child or his parents. There should be no talking about food. His meal time should be a happy time with conversation about things that interest him, part of the time at least, just as adults like their meal time to be.

He should not be fed, but should be allowed to eat by himself. In infancy and early pre-school years, he may need a little assistance to help him guide the food to his mouth. At 1½ to 2 years, however, he usually needs no assistance at all. In fact, he may resent assistance. It does no good to postpone the age at which one lets the child learn to eat by himself. The time to start is when he is interested in helping himself. Even in infancy let him start holding his bottle or cup. Help him at first, but as his muscles strengthen and he can do it alone, let him. At first allow him to hold it only a short time and gradually lengthen the time. Perfect muscle coordination is not learned in a minute. Some children learn to skate at 6, some adults at 60; yet both take spills. Regardless of the age at which a child is allowed to help himself, he will spill things until his muscles are trained to coordinate. Teach the family that he will spill food and let him go to it. All might learn to sing the little song:

FIG. 8. Helen at 15 months eats well because she was allowed to spill food earlier.

At the table he is rude, Baby-mine, Baby-mine,
Puts the hash between his toes,
Puts the molasses up his nose,
And we wash him with the hose, Baby-mine, Baby-mine,
And we wash him with the hose, Baby-mine!

ANONYMOUS

In the meantime, if other members of the family have not already done so before, let them learn now, with baby, to eat the foods needed for best health, growth, and development. For, if mother or dad refuses food, baby will too. Learn, in the same way that baby learns, by eating ½ to 1 teaspoon of everything served until it is liked. Parents may need and want reasonable amounts of rich foods, but they should not be given the pre-school child. According to Mrs. Wiggs of the Cabbage Patch, if you haven't ever tasted turkey meat you don't know how good it is. One mother says, "I cannot refuse my four-year-old pie. It is so good." Yet she is a wise mother generally. She knows pie crust is not good for her child. She knows he is not well. Why did she ever let him taste it? Children are so happy if allowed to grow normally with natural, plain foods.

Some may ask, "But what about that experiment in which children were allowed to select their own food?" As Dr. Davis says, it was an experiment. One of the authors observed it and read the literature about it. In this experiment pie, sausage, fried foods, doughnuts, sweets, candies, sugar, or desserts never appeared on the table. Children had a wide choice of 8 to 11 *natural* foods at each meal. As Dr. Davis said, one child in her experiment during 4 years had never tasted candy, sugar, or ice cream cone. They were never served. [7] If one wants to put 8 to 11 dishes of plain, unseasoned, unmixed vegetables, meat, fruit, fish, milk, eggs, and salt on the table at each meal, before children who have been breast fed 7 to 9 months before coming to this table, successful results might be obtained. That is what happened with the children reported in this experiment. In other words, the children were well-nourished, healthy children who took in, several days or a week, instead of daily, sufficient foods to meet their requirements. But only healthful foods were included in the experiment.

One of the writers recalls a mother using, apparently unsuccessfully, the self-selection method in the bringing up of her child. This mother and her five-year-old child were eating in a restaurant with another mother and her 2 children (ages 4 and 6 years), at the same table with one of the authors. Doubtless, at the close of the meal, each mother went away thinking how badly the other had handled the feeding of her child. The first mother let her child decide what he wanted, and he chose an American cheese sandwich, a glass of milk, and an ice cream cone. The second mother said, when her two children started similar tactics, "No, you eat a full meal." The full meal was vegetable soup with crackers, turkey, mashed potatoes, buttered carrots, tomato salad, ice cream, and milk. The two children gave in, and fell to eating the soup with apparent relish. The other child, having no soup and hence having to wait for his sandwich, grabbed and ate practically the whole dish of white crackers served for 6 persons—and in spite of a scene when someone else wanted some. He was already overweight and did not need calories; yet before he finished he had a very one-sided high caloric diet. The other two children ate all of their meal but got no crackers, of course, and were not allowed to eat their bread. They were both below weight, and needed a few extra calories, which they probably would have gotten if given an opportunity.

On the other hand, this does not mean that a child should never have a day when he fails to meet his minimum requirements nor does it mean that the child should be given no choice in selecting his food. Every child should be allowed to select over and above the minimum needs whatever he wants from the foods offered. Further, everyone has off-days, when to eat even the best food would only make him feel worse. Parents should respect the child's judgment in these occasional refusals and give his digestive system a rest. Such a condition is common at the start of illness when it is unwise or even harmful sometimes to force eating. Furthermore, parents need not worry for fear something will happen if the child has days of no food. Recently the newspapers reported the story of a five-year-old child lost in the woods for 8 days. She had no food and only the water she drank "out of brooks and everything," and, though she had lost 8 pounds and had frost-bitten toes, she was reported as otherwise in a good physical condition.

Lack of Appetite

The size, age, and activity of the child determine how much he should eat of the foods suggested at these meals. It is not wise to force a child to eat. If his appetite is small but he is gaining or if he is of normal weight, more attention should be given to the quality than to the quantity of food. A normal child with the normal quota of teeth should be able to chew any of these foods when 2 years of age. The food should become gradually more and more solid up to this age. If his appetite is small and he is not gaining weight, his lack of appetite should be investigated. He may be eating too much fat, too much candy or sugar, or too much food between meals or, in some cases, he may be taking too much milk or too much vitamin concentrate to the exclusion of other foods. Fruit juice or tomato juice given at the beginning of each meal may be helpful in inducing appetite. A study of a group of nursery-school children showed that they averaged a 20 per cent increase in calorie intake at the noon meal when the meal was started with fruit juice or tomato juice.

Two children recently came to our attention. One would frequently say, "Berry gud dinner." A second, shaking herself, would remark, "I'm grunting because my dinner is so good." The first, when he came to us, had been eating much butter and his head was covered with cradle cap. He was offered a well-balanced diet but had little appetite because he had so much fat that the stomach could empty itself but slowly. He was 3 years of age and wanted to help himself to food and spread his own bread. At the family table this meant taking gobs of butter so that he tended to eat butter with a little bread instead of bread with a little butter. When given his one small pat of butter and a small butter spreader, he learned that he was expected to eat the food served him (the food needed for his well-being). With this simple line of treatment, everything—appetite, cradle cap and disposition—cleared up in 3 weeks.

If the cause of lack of appetite is remedied in infancy, the pre-school feeding will be easy, as shown by the second child. She came to us at 4½ months of age, weighing 14 pounds, 4 ounces, or more than double her birth weight of 7 pounds. She had had a proprietary food since 5 weeks of age and had constipation and gas. When another such food was added, the condition continued. Then she was changed to evaporated milk, and at the time we saw her at 4½ months she was getting 13 ounces of evaporated milk, 19 ounces of water, and 4 tablespoons of Dextri-maltose No. 1. This was given in 4 feedings of 8 ounces at each feeding. In addition, the child was given 1 tablespoon of reinforced cereal twice, 1½ to 2 ounces of grapefruit juice, and 1 teaspoon of cod-liver oil a day. The baby was refusing part of her bottle, her bowels were still constipated, and she always had lots of gas—all of which cleared up on a balanced formula and diet. This meant cutting the milk and cod-liver oil, adding egg yolk, vegetables, and a plain, strained whole cereal. At 3 years of age, under the guidance of a wise mother (see Fig. 1, Chapter III), she now takes from 1 pint to 1 quart of milk a day, eats 3 good meals with some small midmorning and midafternoon lunches, and is well and happy. And what a pleasure it was to watch these two little tots feed themselves!

If a child has little appetite, look for the cause. A normal child on a well-balanced diet should have no difficulty with appetite. Foods, started as liquid in early infancy, changed to semi-solid toward the end of the first year, should become the natural unstrained food by the time the child is 2 years of age. The quantity will be, at most, half of what a moderately active mother will eat. Many people make the mistake of serving little children huge portions of food so that the child's appetite is lessened by the sight of it.

If, however, the child's digestive tract is irritated by bulky foods, fruits and vegetables should be put through a strainer. His digestion and the condition of his bowels should be the deciding factors as to when this is necessary.

Coarse whole-grain cereals are often desirable as part of the bread and breakfast food unless the child has difficulty in digesting them. These cereals should be strained for the younger or more delicate pre-school child.

Little or no sugar is needed on cereal for children. Raisins or dates, cut fine and cooked with cereal, are better than sugar because they add iron and some vitamins as well as sugar to the diet. Brown sugar is preferable to white sugar because of its iron and calcium content.

A small amount of butter may be used on bread and vegetables, and top milk or thin cream on cereal. Very little or no whipping cream should be served to children. Fat in addition to whole milk and butter is not needed in a pre-school child's diet and may interfere with digestion and appetite.

The Child with the Ravenous Appetite

There are children who are always hungry—who "would eat a horse," as the saying goes. For instance, as one of the authors sat writing, the telephone rang and a mother calling wanted to know, "What shall I do with my nine-month-old baby who is just ravenous? She is well, happy, and very active—a little plump."

This baby at 9 months wakes at 5:40, just starved, and gets:

5:45 A.M.	¾ to 1 cup of strained whole cereal 1 tablespoon strained apricots 8 ounces milk
9:00 A.M.	8 ounces milk 1 drop percomorph
12 noon	1 baked potato 2 tablespoons of liver and vegetable soup ¾ cup of strained vegetable 8 ounces milk ½ slice of toast with a little butter
3 P.M.	Juice of 1 orange and ½ to 1 banana with other fruit juice additional sometimes
5:30 P.M.	1 piece of toast ¾ cup of strained cereal 2 tablespoons of strained apricots 1 cup of milk ½ piece of toast

This diet more than meets the needs of a three-year-old (see page 229). The child is out most of the day in the sunshine. The bowel movements were good but she has two movements a day and the mother says she cannot take more vegetable because it is too laxative—especially spinach. Baby likes her milk, and gets 1 quart a day. Her milk is partly skimmed and she gets no egg because of eczema, which started in infancy but is gone now. Mother uses iodized salt in cooking.

Such a situation would be answered as follows:

1. If baby is ravenous, analyze the diet. With partly skimmed milk, no egg yolk, and no cod-liver oil, this baby's diet is low in fat; hence the stomach empties quickly, perhaps too quickly, and baby is constantly hungry.
2. With two movements a day more may be going out than is necessary.
3. It was suggested that the mother continue to add a little more cream to the milk, and that she give baby a bone with a little meat on it and a piece of liver to chew when the family has it. When the baby takes this well, slowly increase to 1 to 2 tablespoons of meat each day. When the family has rice or tapioca pudding or custard, try ½ to 1 teaspoon for the baby and, if this goes well, work up to ¼ to ½ cup once a day. Be sure bread is enriched flour bread and that cereals are all strained whole cereals.

The mother later reported the child's appetite to be normal.

A child may have a ravenous appetite for several reasons. The child may be growing fast and be extremely active or he may be ravenous because some one food nutrient is not present in sufficient amount. For example, a baby on a diet of cow's milk that is not supplemented with some iron-rich food may take an almost unlimited amount of milk. It seems as if nature is trying to satisfy a need which man has not met. A child may be ravenous because of too much laxative food, causing much food to go out as bowel movement.

The Older Pre-School Child

As the pre-school child nears school age, at 5 or 6 years, he is becoming increasingly active, is sleeping less, is growing taller, and hence needs more calories for both growth and activity. The menu of the three-year-old will meet the needs of the older pre-school child if he has more of it. Since the following diet more than meets this older child's requirement, except for calories, he may be allowed to choose from this diet enough to give 400 calories or more of whatever food he wants.

Meals for the Older Pre-School Child

Breakfast

- 1 orange
- ½ to 1 cup of whole cereal
- 1 cup of milk
- ½ to 1 slice or more lightly buttered toast or bread

Dinner

- ½ cup of fruit juice, tomato juice, or fruit cup, except when tomato is the vegetable
- 1 to 4 tablespoons of meat or fish

1 to 4 tablespoons of vegetable
½ to 1 medium-sized baked potato
1 to 8 tablespoons of custard or tapioca or rice custard
½ slice of bread and butter
1 cup of milk

Supper
1 egg
1 to 6 tablespoons of vegetable
½ to 1 slice of bread and butter
1 baked apple or a dish of fruit sauce
1 cup of milk

Eating between Meals

The question has often been asked whether the pre-school child should eat between meals. If the pre-school child cannot take enough food at 3 meals a day to keep up his weight, or if he gets too hungry before meals, it is better to put in a midmorning or midafternoon meal or both. This may consist of fruit or fruit juice and wafers or of bread with a little butter and jam. Preferably it should be something of a carbohydrate predominance that will not stay in his stomach and interfere with the next meal.

FIG. 9. A piece of fruit between meals does not spoil the appetite for the next meal.

Do's versus Don'ts in Feeding the Pre-School Child

In pre-school years as in infancy, the child's diet is best made up of natural foods. It is unfortunate that all children cannot live on farms to have fruits and vegetables from the home garden and to help pick them. Since this opportunity is not open to all, the next best thing is, as far as possible, to select fresh natural foods and to get the child out of doors daily.

Sweets for children should always be judged upon three criteria: (1) What other food materials besides sugar do they contain? (2) Are the sweets free from stimulants? (3) Do the sweets increase or retard the appetite? The best sweets for children are those that contain a minimum of sugar and a maximum of building and regulating foods, such as oranges, apples, dates, raisins, figs, apricots, and prunes. Fresh raw apples, oranges, lemons, and grapefruit, especially the juices of these, also

FIG. 10. Outdoor play

increase the appetite. For this reason fruits and fruit juices with little or no sugar added may be used in midmorning or midafternoon or given as a fruit cocktail to begin the child's meal. Because chocolates and other rich foods may tend to retard the passage of food from the stomach, the child may not be hungry at the meal after eating them. Chocolate, cocoa, and Coca-cola, like tea and coffee, are stimulants. Sweets other than fruits should be given sparingly, with only a small piece at a time after dessert at the end of the meal so as not to destroy appetite for other foods. Besides fruits, molasses candy or molasses cookies, stuffed dates, or Parisian sweets are best to use since they also add building material to the child's diet.

Cheese usually should not be given during the pre-school period. It may contain too much fat for the young child and is not necessary since milk has the essential elements found in cheese. In late pre-school and early school years it may be used sparingly for flavor, however, grated and sprinkled on creamed foods. Cottage cheese, being unusually low in both bone-building and blood-building materials, is not necessary in the diet of

should be free and varied.

a pre-school child who is getting his quota of milk, since it adds mainly protein to the diet and the child is already getting sufficient protein. However, for a child taking little milk, cream-cheese sandwiches may be used.

Any fried or highly seasoned foods, gravy, pickles, coffee, and tea should not be served to children, and only a very weak cocoa should be included in the child's diet. Pie filling without the crust may be allowed, except spiced pumpkin, mince, or rich fillings such as chocolate or butterscotch. Pumpkin custard without spices, baked for the child in a custard cup, makes an acceptable dessert when the adults have pumpkin pie. Pie crusts contain too much fat for little children. Rich foods high in fat content are slow to digest, retard the passage of all food from the stomach, and retard the flow of the digestive juices in the stomach. Because a child's stomach is small, it is not wise to have food remain in it long, for it is then difficult to get him to eat enough food upon which to grow.

Feeding little children is a simple and happy experience for both child and adult if children are served only plain, nutritious, easily digested foods, attractively prepared, at regular times, and if new foods are given only in very small amounts until the child acquires a taste for more.

In conclusion it should be emphasized that in feeding children they must be considered as individuals, and the attempt to make them conform to the same general pattern of nutrition should be carried only so far as each individual is able to conform to it. This pattern of nutrition needs careful watching, for a child's health rests in the hands of the adult who feeds him.

Other Factors Necessary to Good Nutrition

Although at this age a child sleeps less and plays more than in infancy, although he is not weighed weekly, although he now plays outside for his sunbath, still sleep, fresh air, sunshine, water, companionship with other children and his parents, and a happy environment to grow up in are highly important.

When Father Takes Me for a Walk

When Father takes me for a walk
It makes me glad all day.
He puts his hand in mine and says,
"Now, Captain, lead the way."

I take him to the chipmunk's hole,
To ponds where fish are thick
And where the big boys dig for bait,
He whittles me a stick.

And makes a willow whistle, too,
That we take turns to blow,
We scatter petals in the brook
And wonder where they go.

Then when we're tired, we start for home
And talk of lots of things,
Why mother has such cuddly ways
Why birds and bees have wings.

And Father talks of business, too,
And asks me my advice,
Now, wouldn't you, if you were there
Think walks like that are nice?

LOUISE AYRES GARNETT

From *Eve Walks in Her Garden,* The Macmillan Company, 1926. Courtesy of author and publisher.

REFERENCES

1. C. A. ALDRICH and M. M. ALDRICH, *Feeding Our Old Fashioned Children,* Macmillan, New York (1941).
2. H. C. SHERMAN and E. HAWLEY, Calcium and phosphorus metabolism in childhood, *Jr. Biol. Chem.,* Vol. 53, pages 375–399 (1922).
3. A. L. DANIELS, M. K. HUTTON, E. KNOTT, G. EVERSON, and O. WRIGHT, Relation of ingestion of milk to calcium metabolism in children, *Am. Jr. Diseases Children,* Vol. 47, pages 499–512 (1934).
4. J. OUTHOUSE, G. KINSMAN, D. SHELDON, I. TWOMEY, J. SMITH, and H. H. MITCHELL, The calcium requirement of five pre-school girls, *Jr. Nutr.,* Vol. 17, pages 199–211 (1939).
5. I. E. MACLEOD, *A Study of the Eating Behavior of Twelve Nursery School Children,* Thesis for degree of M.S., Cornell University (1933).
6. D. TILDEN, *A Comparative Study of the Eating Behavior of Thirteen Nursery School Children,* Thesis for degree of M.S., Cornell University (1934).
7. C. M. DAVIS, Self-selection of diets by newly weaned infants, *Am. Jr. Diseases Children,* Vol. 36, pages 651–679 (1928).

CHAPTER VI

FIG. 1.

WE GO TO SCHOOL

Contents

A. Preparation for School
B. Influence of School on Food and Health Habits
C. Are School Children Well Fed?
D. Why Are School Children Poorly Nourished?
E. Growth in School Years
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G. Food To Meet the School Child's Requirements

YOUR "cunning" little toddler has now grown up and is off to school. He has lost his baby chubbiness, he has stretched out, his arms and legs have lengthened, he has lost or is about to lose his first tooth. He probably will not attract as much attention now as he did as a toddler. He will no longer be under your supervision 24 hours a day. It is easy to neglect him at this time. However, it is a period of great adjustment for him and yourself, and it is more than ever necessary for him to feel a sense of security at home.

Food is just as important as before. Feeding the child during early school years is very similar to feeding him in pre-school years, the principal differences being a greater total quantity of food and a greater variety in the diet. The same careful consideration should still be given to the quality of his diet even though errors in feeding do not show up as readily as previously. The child's school life tends to create new food problems. School influences his food intake because of the schedule it necessitates. Also such factors as the teacher, the pupils, the noon lunch, and new activities created through school life may affect his nutrition either directly or indirectly.

In addition to the new situations arising during early school years, new problems also arise in later school years because of the child's development through the period called adolescence. The health training or lack of it, carried over from early years, affects this later development.

Malnutrition is prevalent in school children of all ages in the United States. How can one tell the poorly nourished child? Why do we, living in an intelligent, wealthy nation, have poorly nourished school children, and what can be done about it?

Preparation for School

"An ounce of prevention is worth a pound of cure." It is wise to prevent nutritional problems during school years by keeping your child on a good program from infancy. To start the school years right have your child in the best possible physical condition at the time he enters school.

Physical Examination

Mothers, when finished with the shopping preparatory to school, often sigh, "Now the child is ready for school." But is he? Are books and clothes all that is needed to launch your child in school? How can you be sure your child is really ready? If he has been well nourished and cared for during pre-natal life, infancy, and pre-school years, he should now be a well-developed healthy child. However, he may look healthy to you and still have difficulties that a parent cannot see. Most parents are unable to examine their own children with a critical and unprejudiced eye. Your own offspring tend to look perfect to you. You have been so accustomed to seeing them, that you often fail to observe them critically. In addition to this many parents never try to judge their child's state of health. And some only make excuses for defects they see. If a child is not obviously upset, they assume he is well. An underweight child is said to be growing tall and, "He can't grow both ways at once" or "He is on the go every minute and a rolling stone gathers no moss." Then too, parents may have become calloused to defects. For example, a child who walks queerly is said to have an odd gait or the parent may even be unconscious of the fact that he walks with a "queer gait." The child who has to be called in a louder and louder tone of voice before he answers is termed a "problem child." Throwing a temper tantrum when asked to lace his shoes or to do other close work is called "bad behavior."

If iron-rich foods have been neglected in the diet, the child is probably pale, fretful, and tires easily. Parents may not sense these difficulties, or if they do they may not be able to diagnose the trouble. Therefore, in fairness to the child a doctor should give him a thorough physical examination, preferably in the spring before starting the first year of school. This gives time during the summer to remedy any defects or difficulties discovered.

Defects in a child's health are much too common and too frequently ignored in the United States. The longer they are neglected, the more serious they usually become. Unfortunately, like many other worthwhile things, a physical examination by a physician which will bring these difficulties to light, is easy to "put off." A physician is called only when the parents know the child is sick. A parent who is taking a long-time view of his child's health and well-being will have his child examined for defects and deficiencies and will put forth every possible effort to correct them.

Other Ways of Preparing for School

Suitable clothing for the school child is important to his comfort and to his peace of mind. Uncomfortable clothing causes distress, hampers bodily freedom, and by making the child conscious of his clothes interferes with his school work and his health. If a child, particularly a timid child, feels that his clothing is not correct, it makes him ill at ease and causes him to be increasingly timid and shy. Some of you may remember the sensitive feeling you had when sent to the blackboard with squeaky shoes. An experience such as this also interferes with school work.

Other factors which by now should be routine in getting the child ready for school include plenty of sleep, a good breakfast, and proper elimination. Sufficient sleep is essential if the child is going to be ready to "tackle" the day's work well. He should get to bed early enough so that he can be up in the morning with enough time to dress, eat a good breakfast, and go to the bathroom, without being hurried. If the child is put to bed on time regularly, he will awaken himself on time. If the child is not to feel hurried, there must be a calm atmosphere in the home.

If your child has had the companionship of other children, if he has already had books to read and pencils with which to write at home, adjustment to school will be easier for him than if these are new or unaccustomed experiences to him.

Influence of School on Food and Health Habits

Various new influences enter the child's life during school years. They may greatly affect his food and health habits. They include the school schedule, the teacher, the pupils, the noon lunch, and the activities created through school and school friends.

The School Schedule

The school schedule tends to make for regularity. If the child has lived more or less on schedule, he will accept the school routine and adjust to it easily. If, on the other hand, he has been allowed to go to bed at any time and get up when he feels like it, he may find it difficult to get up at a certain time, eat breakfast, and be at school on time. To be hurried through this procedure starts the day badly. He arrives at school not having had time for proper body elimination and with a sense of frustration from being hurried. The wise mother will simplify life for both herself and the child by seeing that essential home-life routines run smoothly.

The school program leaves less free time for the child, usually also less time outdoors in the fresh air and sunshine. This may easily affect the child's appetite and his ability to gain weight. Therefore it is important with these added pressures to make a plan for the child to spend as much time as possible outdoors. The group method of teaching used in our present system of education produces a spirit of rivalry and competition and this may cause the child to feel under pressure. The sense of freedom given by outdoor exercise will help counteract this. If the child is under pressure both at school and at home, his nervous system is almost sure to be affected. There should be some period during the day when he has time to relax and does not have some definite duty to perform.

The Teacher

The child's life has been influenced so far largely by his immediate family. Now that he goes to school he will contact many other individuals, adults and children. They will influence his life too. The most important of these adult influences will be that of the child's first teacher. An understanding teacher exerts a powerful influence for good. Suggestions on food and health habits coming from her may be especially effective. A teacher who does not understand children may so undermine a child's sense of security and so affect him nervously as to interfere with the utilization of his food. However, the teacher has the child a relatively short time and perhaps not at all at meal time so that the parents should not expect too much from her. To be cognizant of the effect of school on the child is the parent's responsibility.

The Pupils

Other pupils in the school are a source of new friends for your child. The child not only sees them at school but he also visits other homes and, we hope, will bring other children home with him occasionally. He will eat more meals away from home than he had in his younger years and will be influenced by the habits and customs of other friends.

For instance, Mary had lived most of her 8 years in England. Her family clung to many of the English traditions. Mary and Eleanor were great friends. Eleanor was invited to play with Mary after school. To her great surprise Mary sat down and had a cup of diluted tea with her mother. To Eleanor tea was for grownups only.

Doris was getting a teaspoon of cod-liver oil a day. She came home and announced that Jane did not take cod-liver oil and so why should she. Her mother was somewhat baffled but replied, "Every mother does what she thinks is best for her own child. I think my little girl needs cod-liver oil." Doris took it without further question.

These example demonstrate the advisability of parents' being on the alert to help their children make adjustments to new situations.

Other Situations Associated with School

The Noon Lunch

The school schedule provides but a short time for the noon lunch. It may mean that the big meal which was formerly at noon should be changed to evening. The child may still have his noon lunch at home. If he comes home for lunch, food should be ready for him. Children frequently are sent to buy food for the lunch after they get home. Naturally, this necessitates hurried eating and often too little food intake. But if the child lives some distance from school, he will carry his lunch as will many of his friends. He may see nutritious lunches or he may see doughnuts, pie, pickles, cold pancakes, and all sorts of new and curious foods. He may see children who eat well or he may see some with poor food habits. He may imitate any of these groups. The food for the school lunch will be discussed later.

Extra-Curricular Activities

In addition to the regular school schedule the child often carries on other activities such as music, dramatics, dancing, clubs, and various sports. Some of the activities are in connection with the school program and others may be entirely separate. They play an important part in the child's life and development. Therefore the child should not be deprived of them. They should, however, be included in moderation. Too frequently, in many communities, the child is overburdened with such activities. In such cases they prove to be a detriment rather than an asset. The child's program is too full. He gets overtired. He is unable to do his best work in school. He is upset and does not eat well. He is restless and does not sleep well. The child's health is affected, and so with the best of intentions the parent has defeated his own purpose in trying to give the child all the advantages possible. Before any extra-curricular activities are started, be sure that your child is physically, mentally, and emotionally able to do more than his regular school work which should come first.

The school and its contributing factors affect the child. But remember that your child is in school only about 25 hours a week or 1 out of every 9 hours throughout the year. The teacher should not be expected to accomplish things in which you have failed when, until now, you have had the child 24 hours a day with only one or at most several children to supervise, whereas the teacher must be responsible for many. The home, during school years as well as other periods, may be the greatest influence on the child's life. Just as the language heard in the home probably has more influence than all the English lessons received during his entire education, so the food habits of the home have a lasting effect.

Are School Children Well Fed?

With this question in mind, visit the school room and study the child. The authors could not visit a farm and critically judge the stock or the crops. Yet a trained and experienced farmer could give some simple guides by which to judge the good from the poor cattle and why, as well as to determine which plants are best and why. Perhaps you, as a mother or teacher, lack training and experience in judging the well-nourished from the poorly nourished child. The first requirement, therefore, is a standard for comparison.

Methods for Judging the Nutritional Condition of Children

One method for judging nutritional status is by observing the child. Study the child with these points in mind. Does he have an alert expression, glossy hair, unobstructed nasal breathing, bright eyes, a clear skin with no blemishes, and bright pink membranes of the lips and eyelids? Do you see well-formed jaws with even, well-enameled teeth; a broad chest; straight legs and arms, and knees that are neither knocked nor bowed; firm, strong muscles; and a weight that is suitable for his height and build? Does the child show good muscular coordination and an ability to relax? If you observe him for 24 hours a day, you should find that he has a good appetite, sleeps quietly and soundly, and has a bowel movement every day. How many children can you find who will answer these qualifications? Even a person with an untrained eye should be able to see that many children fall short.

If one is unable to observe the child critically and see him as he is, there are tests for checking his nutritional standing. The height-weight chart and an examination by a physician have been used for determining a child's state of nutrition. The child's diet and health habits also furnish a check as to whether the child is on the road to health.

The height-weight chart has been widely used, especially for dividing children into groups, but it has serious drawbacks. It is, after all, only a single one of many factors in measuring a child's nutritional status. A child may be of proper weight for height and still have many deficiencies which will not be recognized by this criterion alone. The weight-height of an individual child may act as a good supplemental guide to the nutritional condition of the child when used in addition to a medical examination. Also the amount of growth of a particular child over a definite period of time is significant in judging that particular child's nutrition. Good nutrition shows not only in height and weight but also in an alert mind, the ability to concentrate, emotional stability, bright eyes, glossy hair, and good color. These factors cannot be measured by inches or pounds.

A study by the United States Children's Bureau showed the inadequacies of height-weight alone for judging nutrition. In a study of 3000 children, a comparison was made between the grade of diet and the grade of nutrition. Although diet is not the only factor in judging the child's nutrition, certainly one would expect a high correlation between his diet and his state of nutrition. The child's nutritional status, however, was based on his weight alone. When weight alone was used, a high percentage of children on the lowest type of diet was classified as "excellent" in nutrition. [1]

This is not surprising since people on low incomes often eat high-carbohydrate diets and children add pounds out of proportion to quality of tissue.

The physical examination is a more thorough method and thus finds more characteristics which reflect good or poor nutrition. In a study of 256 children in a rural section of the country, the grade of nutrition was determined by a physician in connection with a physical examination. The relationship between diet and the grade of the nutrition in this study were remarkably close. It is also interesting to discover that 40 per cent of the children in this study were judged to be poorly nourished, whereas only 26 would have been classed as poorly nourished if judged by weight alone. [1]

The food and health habits of the child are largely responsible for his state of nutrition. Therefore checking these habits gives a good clue to the necessity for further health education both for the child and for the parents and teachers of children.

Studies Show Poor Nutrition Prevalent

Studies of school children indicate that poor nutrition is needlessly common among children of the United States. This is shown both by the prevalence of poor diets and by the known defects or deficiencies caused by poor diets. In a health survey including 86 cities and 35,000 school children, it was found that nearly one-half of the children were having less than 1 pint of milk daily. A survey giving the food habits of children in Nebraska showed that over one-half of the children lacked 3 or more basic foods in their diet on the day the survey was taken. [1]

A study of school children in Ann Arbor, Michigan, showed 80 per cent with dental defects. [2] Judging from a summary of a survey in 21 sections of the United States [1], it would seem that this is typical of the country at large. Although we do not know the complete story of tooth decay, certainly nutrition plays an important part. This study shows need for improved diets. Decayed teeth often cause poor chewing or the pain from decayed teeth may cause lowered food intake. Figure 2 shows how Sally lost almost a pound of weight in one week apparently because of toothache not attended to.

This picture of the school children of today leaves a rather dark outlook for the health of America tomorrow unless something is set in motion for its improvement. Perhaps we could somewhat brighten the picture by referring to Table 22, Chapter II, and noting that in general the consumption of dairy products, fruits, and vegetables has been increasing in the United States. We like to think that the health and nutrition work of the last decade is reaping some benefits.

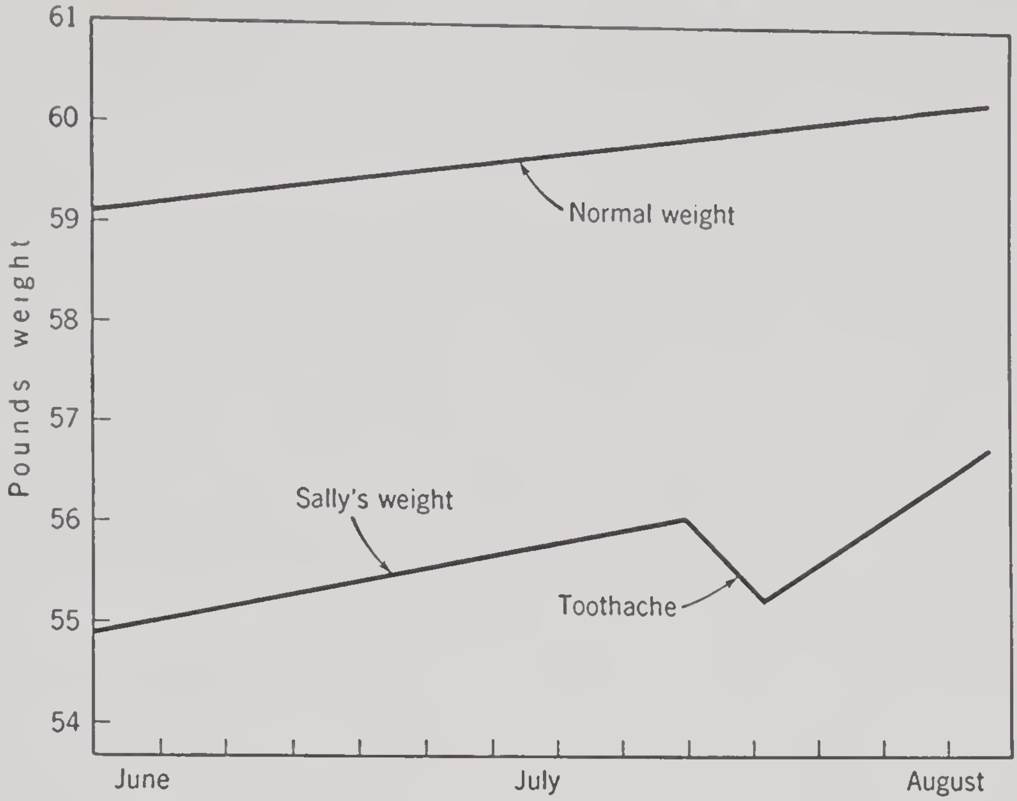


FIG. 2. The weight chart shows that teeth should not be allowed to go unattended.

Why Are School Children Poorly Nournished?

The answer to this question is not always simple. Poverty plays a part but we find many poorly nourished children in wealthy homes, as well as well-nourished children in poor homes; so certainly the economic status of a family cannot be the sole cause. Therefore it may be assumed that malnutrition of children is largely a matter of ignorance or negligence on the part of the adults responsible for children. Sometimes one, two, or all of the above-mentioned factors are involved in producing malnutrition.

Poverty

If you stand on the street corner in your own home town on a Saturday afternoon and watch the children for signs of poor nutrition, you may be surprised to see what social and economic standings are represented by the poorly nourished. In the home town of the authors we see such children from down by the railroad tracks and from poorer farming areas back in the hills. Obviously these children come from homes of low-income groups. Many show signs of poor nutrition, but not all. If these mothers were told how best to spend the income they have and could be helped to the point where the dietary habits of the family were thereby favorably affected, certainly their nutrition could be improved. We see children from the farm and from homes of the day laborer.

Living in a university town, we see, in addition, children from graduate students' homes, from professors' homes, and from the homes of business men. From each of these groups, we see both well and poorly nourished children. Pampered children from some of the wealthy homes sometimes present a more deplorable picture of malnutrition than those from the poorer sections. Therefore factors other than money are sometimes responsible.

Admittedly there are families in this country whose incomes are not sufficient to feed them adequately. In these families poverty is undoubtedly the principal cause for malnutrition. There is no proof, however, that extra income would be spent for better food. Sometimes, where money is scarce, the sense of values is also at fault. For example, one family on welfare was given food rather than money to be sure the money was not spent for something else. The wife and mother went to the beauty parlor to see if they would exchange food for a permanent wave. This mother knew the social value of appearance. It was tremendously important to her. She probably had had no emphasis in her formal education upon food, its value and its effects upon health. We cannot sit back smugly and say that all are provided for in our land of plenty. Poverty is undoubtedly a cause of poor nutrition but not the sole cause.

Ignorance and Negligence

The other causes of poor nutrition among school children fall under the headings of ignorance and negligence. By ignorance we refer to lack of specific knowledge. The mother may be highly educated and still not know what should be included in a child's diet. She may not realize the importance of food, sleep, fresh air, sunshine, and outdoor play or the dangers of poor food, overactivity, and lack of quiet leisure. Other mothers may know the facts but fail to realize their importance and fail to see that they are put into practice. Bridge, teas, golf, or various social functions may fill her time. Or perhaps she is the meticulous housewife who spends much of her time rubbing, polishing, mending, and thereby fails to include what she knows to be essentials. Ignorance and carelessness show up in the poor diet and poor health habits of great numbers of our population.

Children, especially the pampered ones, may be "unmanageable." The parent may know and wish to do the right thing but has no control over the child. Children of all ages can take a lot of "letting alone." A normal healthy child who is allowed to sleep, exercise outdoors, and live in a calm environment will eat when offered wholesome, nourishing foods at regular hours. We realize that the child cannot always come first—that he must fit into the family program. There are times when he must wait to be put to bed, or to eat, or to have his bath. We believe that a normal healthy child can adjust to these necessary occasional interruptions of routine.

Poor Diet

Too much emphasis cannot be put upon the fact that a child to be healthy must eat and assimilate the proper amount of well-prepared food. His diet may be poor because it lacks some essential nutrient, because it lacks sufficient total amount, or because it contains too much of one particular food nutrient or too much in total amount. The child needs all the food nutrients discussed in Chapter II. The amount and how to supply it will be discussed later.

Insufficient Food

Why do we find school children getting an insufficient amount of food, either of a certain food nutrient or of the total intake? Because the needed food must first be provided for the child, and, second, the food must be eaten by the child.

The food may not be provided because of poverty or because of poor food selection. But if the mother will learn the nutritive value of inexpensive foods (see Table 6, Chapter VII), it is possible for many to feed the family well and to do it with the income available.

Lack of time may be the excuse. The mother may think she is too busy to spend time preparing food. She may work outside the home or she may have a large family and do all her housework, and so "time out" for planning and preparing balanced meals looks burdensome. We often hear that a person finds time to do the things she really wants to do and so believe that if the mother realized the need for attractive, nutritious food, she would take pride in finding time to prepare it. Simply prepared, nutritious food is all that is needed. What could be better than a nicely cooked meal of steak or hamburger, buttered potato and some other vegetable, a plain lettuce salad, fruit either cooked or fresh, and a glass of milk?

On the other hand, the mother may have sufficient money, sufficient time, and realize the need for good food and prepare it well for the child, but, unless he eats it, it can do him no good. The school child may not take time to eat, he may have food dislikes which make an unbalanced diet, or he may lack appetite.

The child may not be up in time for breakfast, so that he skips it entirely or very hurriedly "downs" a small amount of food. This decreases the total intake for the day and may eliminate the main source of vitamin C in his diet. A child may be in a hurry to get to school on time or in a hurry to play with his friends, and at the moment these seem more important to him than food.

Food dislikes do not necessarily decrease the total food intake, but often they tend to make for unbalanced diet. If your child is of school age and still has dislikes for foods which furnish the essential food nutrients, follow the same procedure as given for teaching the pre-school child to learn to like foods (see page 231).

Lack of appetite, which frequently causes too low a food intake, may be due to one or a combination of factors. The child may be overtired from working or playing too hard or from lack of sleep. He may be overstimulated from too active a day and hence not eat the proper amount of food. Lack of sufficient outdoor play also lessens his appetite. This may be because his day is too filled with other activities or because he has no place in which to play. Faulty food habits such as lack of sufficient water and eating between meals, particularly of sweets, dull the appetite. Also, irregular meals affect the food intake. The child may have been hungry at 6:00 o'clock but have lost his appetite by 7:00 o'clock; or maybe, while waiting, he has been "piecing" on the wrong kinds of food. If food is not served attractively or cooked well, it loses its palatability and consequently may be left untouched. This is particularly true for the adolescent girl. This same girl may feel that it is sophisticated to skip breakfast or to be a light eater, or she may be trying to keep a slender figure. A greater interest in athletics is tending to change this attitude. There was a day when it was the usual thing for women to appear pale and to faint easily; that day is now history. Most girls of today appreciate the fact that good health means more beauty than ill health, and therefore the idea of underweight meaning sophistication is on the decline.

Parents may encourage poor appetites through lack of understanding of food needs and psychology. Children imitate food dislikes of parents. Conversation during the meal should be pleasant. Nagging should be avoided as it may cause the child to eat less food.

Poor appetite results in too low a food intake. This means a deficiency of some of the needed nutrients. Low iron intake, resulting in poor color, is common. The iron intake needs to be watched particularly with the adolescent girl, since her need is greatly increased. If she spends her money for candy and sweets, she tends to lose her appetite for nutritious foods and this in turn may result in poor complexion, poor color, tooth decay, and lowered resistance to disease.

It is not wise to force a child to eat food. If the child does not feel like eating, find the cause of lack of appetite and remedy it.

To stimulate the appetite, include an abundance of thiamin (vitamin B_1) foods. Begin the meal with fruit, fruit juice, or meat broth. Make the meal as attractive and palatable as possible. See that the child gets plenty of sleep, rest, outdoor exercise, fresh air, and sunshine.

Aside from these factors, the child may have physical defects such as diseased tonsils, adenoids, and decayed teeth, and these if not corrected will soon affect his appetite and his food intake.

Too Much of the Wrong Type of Food

A child or an adult may eat adequate quantities of food but be qualitatively underfed. With a child, whose tissues and bony structure are growing, this shows up more quickly as malnutrition than in an adult. The amount of food we eat is influenced by habit. The child as well as the adult may have the habit of continually overeating. This often leads to inactivity, overweight, and poor development. More is heard about the evils of underweight than overweight during childhood but either may be detrimental. The family may enjoy rich foods and, if the child satisfies his appetite with these, he may have too high a caloric intake, or he may eat them to the exclusion of other needed foods, or he may take too large quantities of food because qualitatively his needs are not met. Eating between meals often leads to too much food or too little, depending upon what is eaten. Eating sweets between meals tends to dull the appetite and may lead to too little total food consumption. On the other hand, the child who eats starchy foods as toast, crackers, and cookies between meals may easily take too many calories but be qualitatively underfed. The mother of a child who didn't like milk was told that he didn't need milk because he was already too fat. This did not take into account the fact that starchy foods will not supply the minerals needed for bones and teeth as will milk. Irregular meal hours may lead to overeating. The child may be very hungry and thus eat too much. Some children fill up on foods they particularly like and leave no room for other needed foods. This may leave the child unsatisfied and create a further desire to eat. Thus too much food or too little food may result in a poor diet and and a poorly nourished child.

Wrong Kind of Food

Many parents think that if they furnish food and plenty of it for their children there is no reason why the child should be malnourished. They often resent reports from school saying that the child is below par physically in any way. However, we cannot make bones, muscle, and blood out of energy or fuel foods alone. The child who goes to school day after day on a breakfast of pancakes, syrup, and coffee cannot hope to build the best bones, muscle, and blood on a diet which lacks some essentials like calcium, phosphorus, iron, and the vitamins.

A hard-working adult, with his increased energy demands, can digest and use satisfactorily some of such foods as pancakes, pie, doughnuts, and fried foods. However, if given to the child, they tend to hold food in the stomach too long and thus take away the appetite for foods needed especially for growth and development.

A group of poorly nourished fourth-grade children in a "health class" were asked to list the lunch which they had eaten that day. With but one exception every child listed pie. The majority of the pies were fruit, such as apple, cherry, and raisin. If parents would give the child the filling without the crust, he would then be able to take larger amounts of other nutritious foods.

Poor Health Habits

Important as food is, it alone cannot by itself make a well-nourished child. A child's body must be in a condition to make the best use of that food. Sleep, fresh air, sunshine, exercise, and a happy environment all contribute in developing a strong body.

Children need more sleep than adults. The amount will depend on the child himself. The child's disposition and gain in weight are two guides for determining whether or not he is getting enough sleep. Lack of sleep makes a child irritable. A fatigued, irritable child cannot make good use of food, neither can he do his best work at school. Movies, radio, home lessons, and work or play beyond his strength all tend to rob the child of sleep.

Twelve-year-old Harry didn't get enough sleep. He worked until late at night in his father's magazine and cigar shop, much too late for a child. And then he was up early in the morning to deliver papers. One day, as the teacher was telling of homing pigeons being so tired that they ran into the church steeple, Harry fell asleep. Harry, like the pigeons, needed sleep, and so he was not awakened until the next class period.

If your child is not gaining or is losing weight, check his sleep habits. When the body is completely relaxed and at rest, it requires the smallest amount of food. When awake and active, the food requirement is increased. Continually getting too little sleep may lead to insufficient gain or even loss of weight. Figure 3 shows the effect of rest on Bob's weight chart. Bob was the "race-horse type" of a boy. If there were any active games Bob was always participating. Bob tried to gain weight but made little progress until the teacher induced him to take an hour's rest period each afternoon. This was done lying down with his head propped up, and a good book to read.

Ellen, aged 10, who was much below weight, was coming along well until her mother went away for a week and left her in charge of her 3 young brothers. Ellen reported that, try as hard as she would, she could not get to bed at night until after 10:00 o'clock. Note Fig. 4, how her weight went down during this week, but started up again after her mother returned.

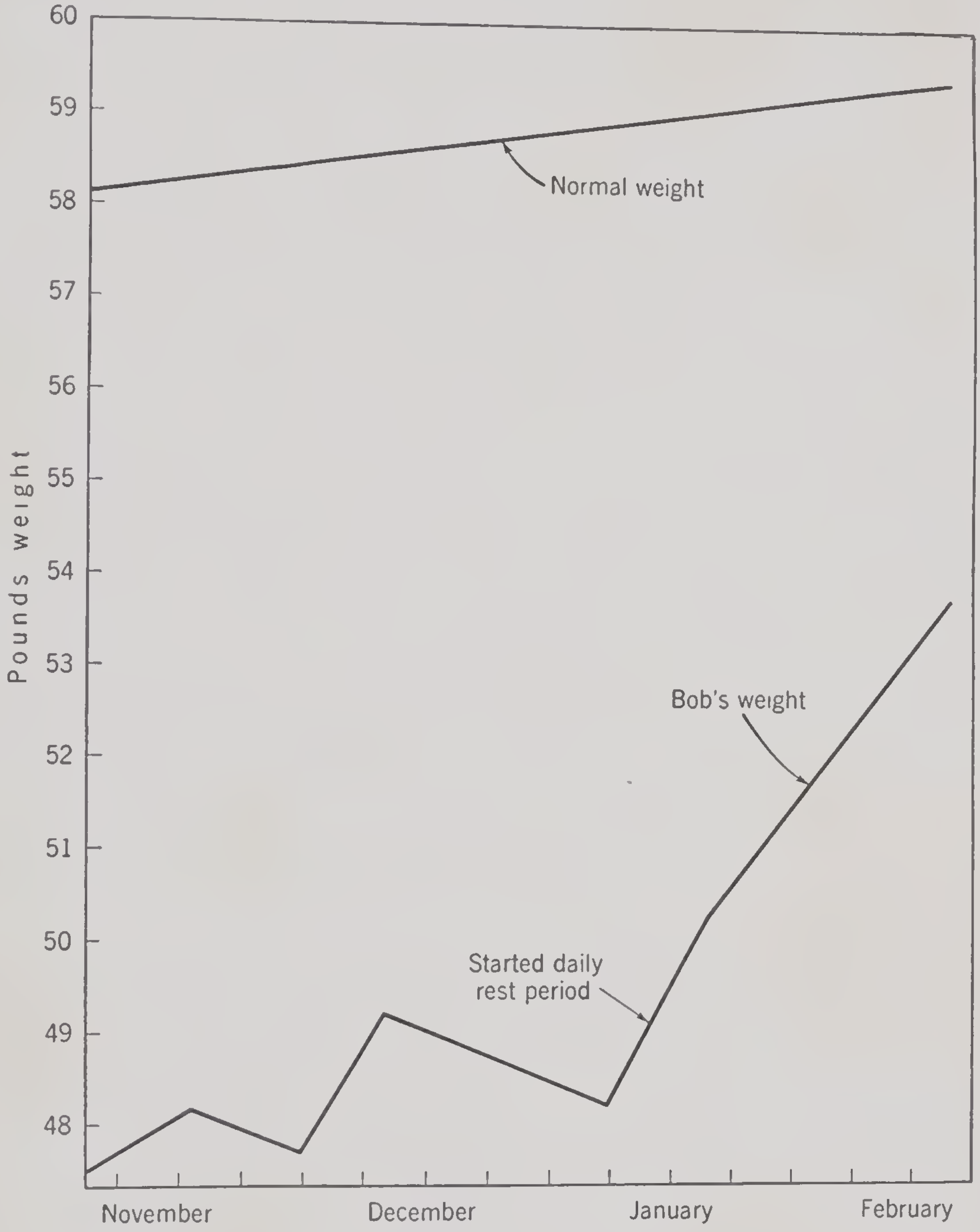


FIG. 3. Some children need to learn to rest.

The overtired child often deceives his parents regarding the amount of sleep needed. Rather than become sleepy, as a child normally does when tired, he tends to become more active, talks louder, and runs faster. He is restless and has difficulty going to sleep after being put to bed, may cry out in his sleep, often awakes early in the morning, and is ready to start another day. These symptoms show the need for more sleep, rest, and quiet play.

Firm muscles are the result of good diet and exercise. The muscles must be used. If the exercise is taken outdoors, the child can get his fresh air, sunshine, and exercise all at one time. The school years are often the most active years; so the parent must watch for signs of too much exercise, resulting in overfatigue. On the other hand, there may be lack of exercise. If the school child is not interested in sports, exercise may be overlooked. Perhaps this is the child who needs it most. The infant is wholly dependent on his parents or adults for his exercise. Gaining independence is part of the process of "growing up." The pre-school child develops inde-

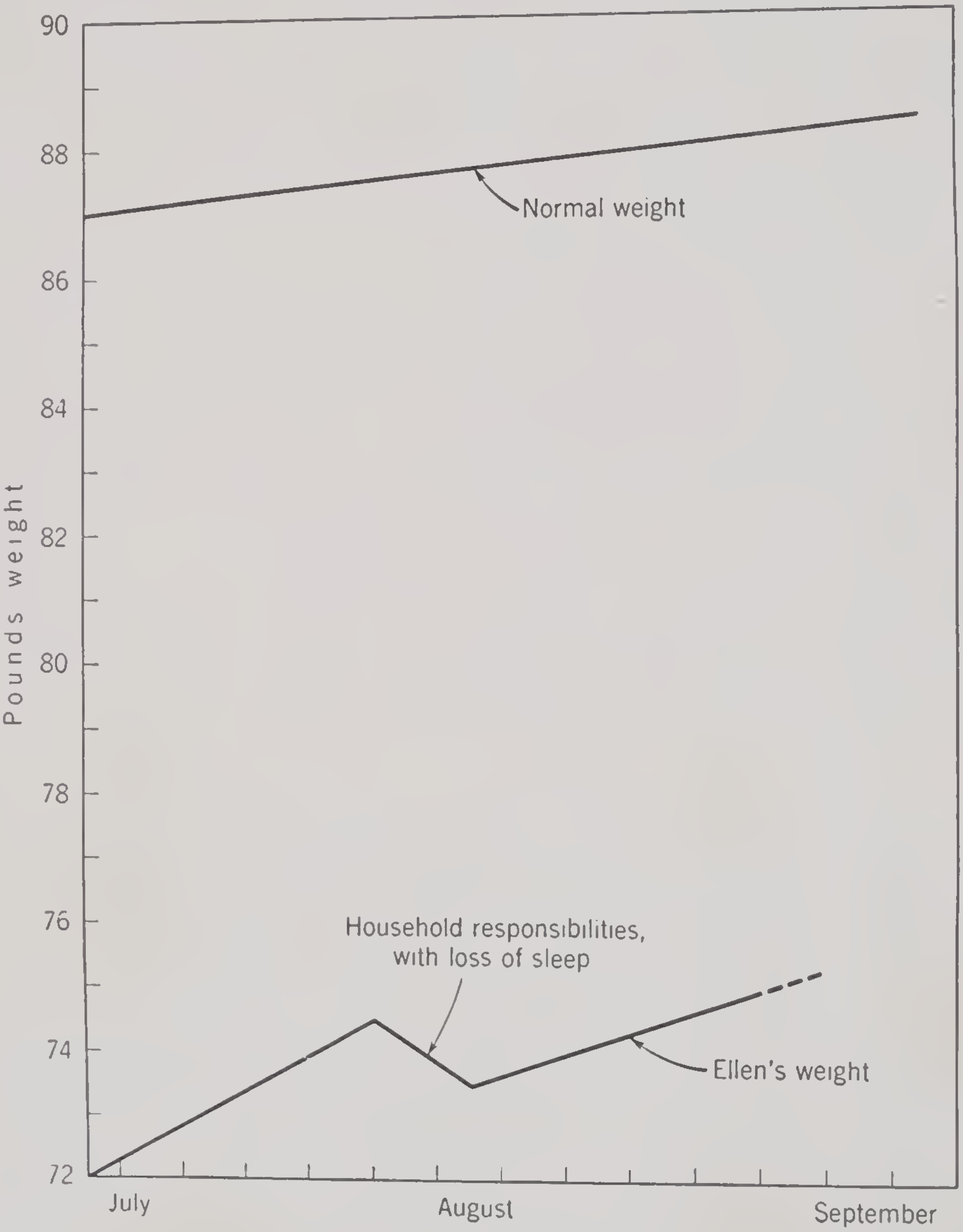


FIG. 4. Lack of sleep may affect weight.

pendence in many ways, but it is still the parents' responsibility to see that his life runs smoothly and that all the essentials are included. When a child reaches school age, he is more or less on his own and frequently neglects such factors as outdoor play. School hours often take the greater part of the day; therefore parents should see that the child gets out of doors when at home and especially on weekends. The young school child has learned many new and interesting indoor activities. The older school child acquires interest in such indoor activities as dancing, dramatics, foreign languages, and typing. Too many parents think only of the value of such activities in the mental and social development of the child of this age, to the complete neglect of his physical development. However, if his health is neglected it will probably be reflected sooner or later in his mental and social life as well.

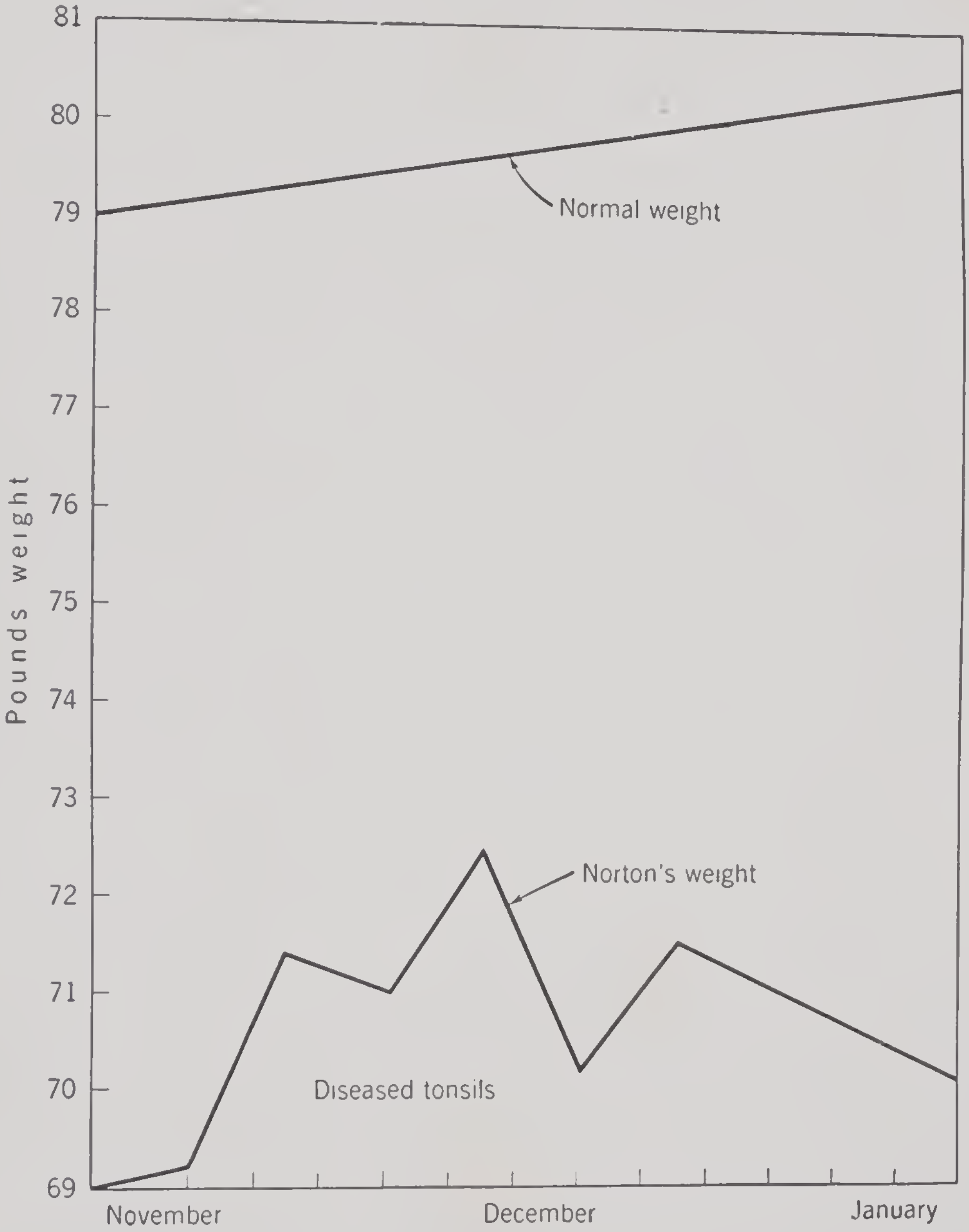


FIG. 5. Diseased tonsils, as well as diseased teeth, affect a child's development.

Physical Defects and Disease

Physical defects and disease may be the cause of poor nutrition, or vice versa. A parent may know that his child's sight or hearing is defective or that his tonsils are diseased but feel that he is not financially able to remedy the trouble. A parent may be unobservant and may not realize that the child is suffering from these handicaps or the parent may know they exist and simply be negligent. The results are often serious. Infected tonsils, decayed teeth, or diseased sinuses may secrete poisons into the blood and cause much difficulty.

Figure 5 shows the effect of diseased tonsils on the weight chart. Norton tried to get his weight up to normal (the weight shown by the solid line at the top of the page) but his diseased tonsils would not let him. You may notice how it went up and down, and yet, at the end of the year, he had made very little gain. Illness, whether temporary or chronic, affects the child's nutrition. These physical defects and illnesses can best be discovered by the physician and he should suggest the proper procedure for remedy and cure.

See that your child is getting the right diet, plenty of sleep, rest, fresh air, and exercise; that he has a calm home environment in which to relax; that he is free from defects and disease. All these factors affect his food intake and the body's ability to utilize the food.

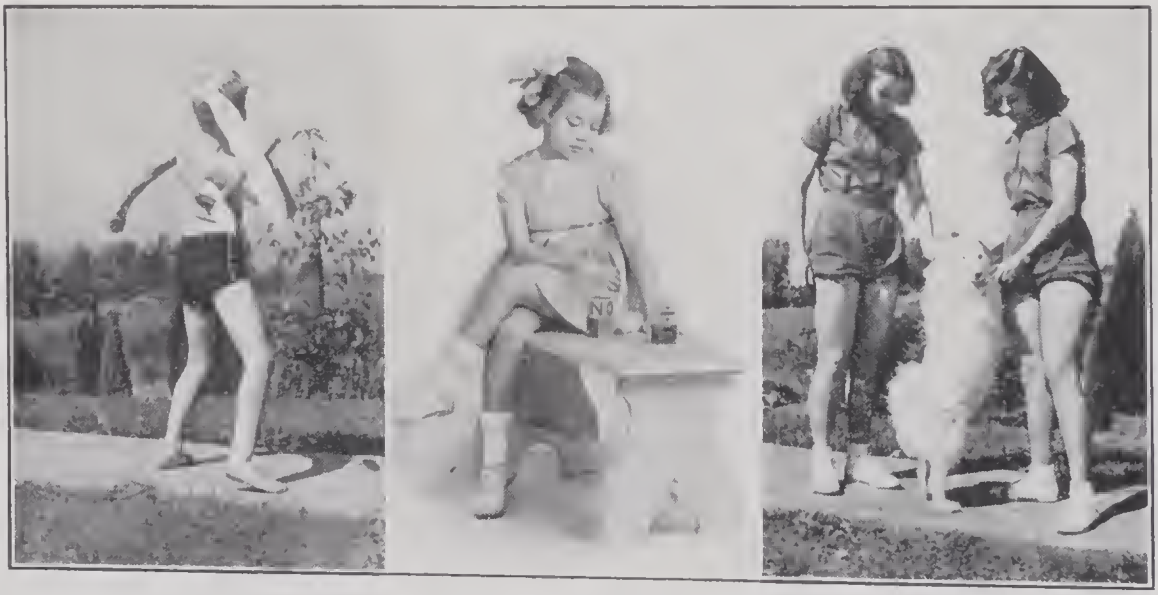
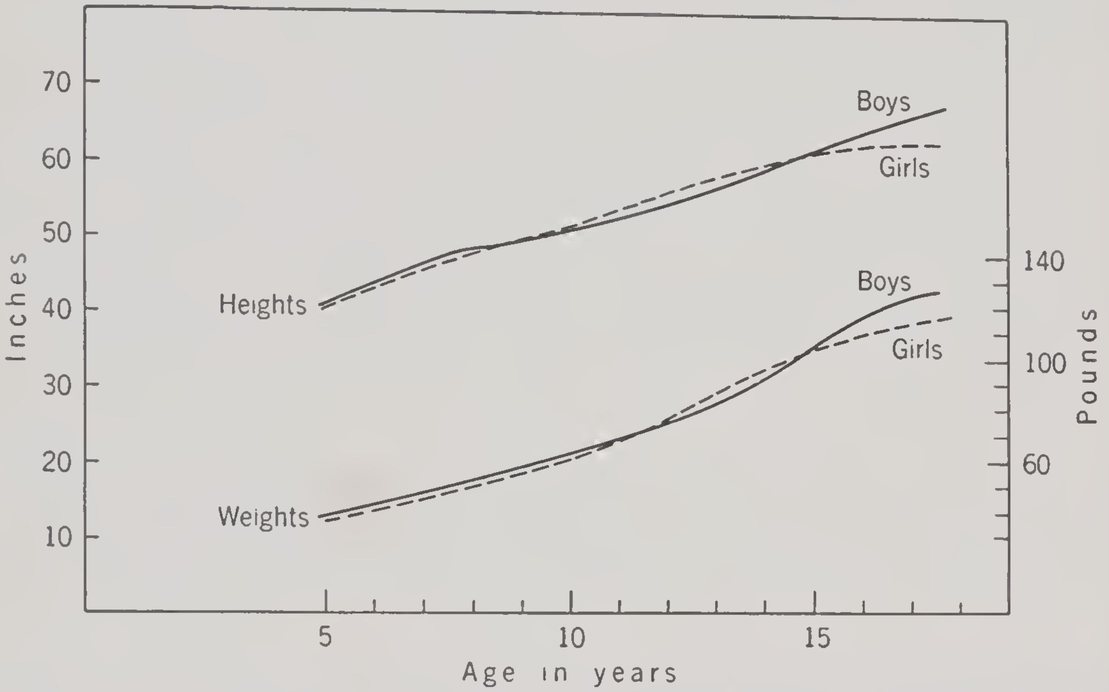


FIG. 6. Study your child as he plays.

Growth During School Years

School years are a period of growth; the rate varies with individuals and at different times during the child's life. Many factors other than food affect growth in height and weight. These factors include the child's age, his sex, nationality, the season of the year, illnesses he may have had, and the economic status of the family.

The greatest period of growth is during pre-natal life. The post-natal growth of children is usually divided into four periods: rapid growth in infancy, a slow gain through childhood, a rapid growth during adolescence, then a decrease until they attain their complete stature. (See Fig. 3, Chapter V.)



Courtesy of authors and publisher

FIG. 7. Comparison of boys and girls, in height and weight. Adapted from *School Health Problems*, Chenoweth and Selkirk, Fig. 4, p. 16, F. S. Crofts (1941).

Boys tend to be slightly taller and heavier than girls of the same age during early childhood. From about 10 or 11 years of age to 14 or 15 years, girls are usually superior in height and weight to boys. Thereafter boys catch up with and then pass the girls (Fig. 7). Psychologists say that much of the antagonism between boys and girls, characteristic of children from the fifth grade through junior-high school, may be traced to this inequality in growth.

Because some characteristics of growth are common to certain nations, we find nationality sometimes given as a factor influencing growth. Present evidence would indicate that this is not due entirely to heredity, however, but is due partially to food habits and to climate and environment as well. For example, children born of Russian Jewish parents living in the United States average greater height and weight than those living in Russia. [3]

The economic status or environment of the family seems to have an effect on growth, presumably because of better food. A study of school children in California showed that children from the good residential area were, on the average, taller and heavier than those from poorer districts. [4] Another study showed that children of private schools were on the average taller and heavier than children of public schools. [5]

Children frequently grow more rapidly during certain seasons, owing perhaps to factors other than season. The best gain is often made during the months when the child is on vacation, when the climate is favorable, and when there is less likelihood of infection. Illness, whether acute or chronic, tends to decrease growth. The fact that some children make a steady gain regardless of season seems to make it questionable whether there is much effect solely due to season.

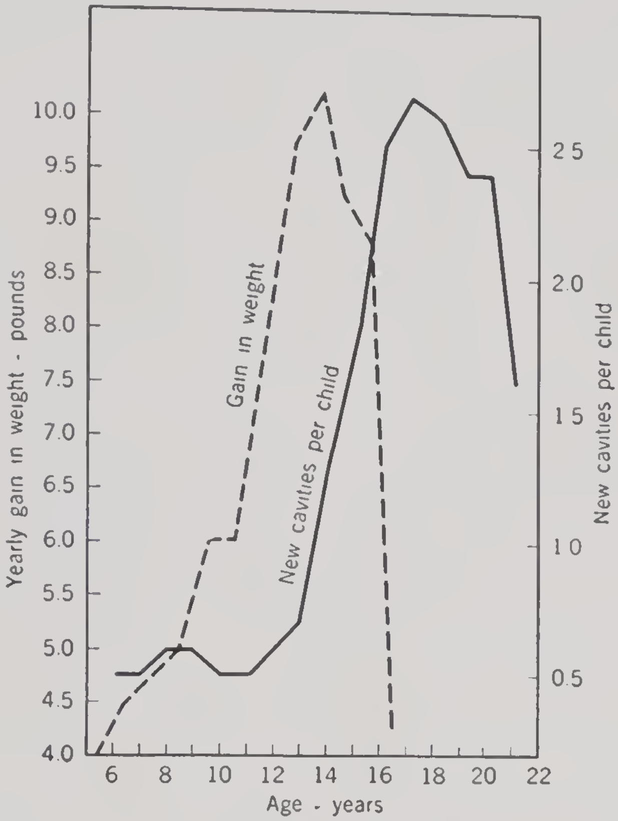
There seems to be a tendency in recent years for children to grow to greater height and weight. A study of Stanford University women showed an average increase of 1 inch over a period of 30 years. Many studies show this same tendency. Whether this is due to better food, better living conditions, or other aspects of a general rise in standards of living we are unable to say.

Table 1. Average Annual Increase in Weight and Height

Age	Boys		Girls	
	pounds	*inches*	*pounds*	*inches*
0 to 1 year	14.0	9.0	13.5	8.5
1 to 2 years	6.0	4.0	6.0	4.0
2 to 3 years	5.0	3.5	5.0	3.5
3 to 4 years	4.0	3.0	4.0	3.0
4 to 5 years	4.0	2.5	4.0	2.5
5 to 6 years	4.0	2.0	4.0	2.0
6 to 7 years	4.0	2.0	4.0	2.0
7 to 8 years	4.75	2.0	4.5	2.0
8 to 9 years	5.25	2.0	5.0	1.75
9 to 10 years	6.0	2.0	5.25	2.25
10 to 11 years	5.0	1.7	6.5	2.0
11 to 12 years	6.5	1.8	9.5	2.5
12 to 13 years	8.0	2.0	10.5	2.0
13 to 14 years	10.0	2.5	9.5	2.0
14 to 15 years	12.5	2.7	7.5	1.25
15 to 16 years	13.75	2.7	6.0	0.75
16 to 17 years	6.5	1.2	3.5	0.50
17 to 18 years	5.0	0.5	0.5	0.20

From *Diseases of Infancy and Childhood* by L. E. Holt. Courtesy of Appleton Publishing Company

Rapid growth during school years affects the bony structure including the teeth. Much interest has been aroused on the subject since such a high proportion of the draftees have been refused or deferred because of poor teeth. School examinations show a high percentage of decayed teeth in school children.



Courtesy of Standard Brands

FIG. 8. Relation of rate of growth to age-occurrence of tooth decay in adolescence. The curve representing rate of growth (yearly gain in weight) is based on data of L. E. Holt in *The Care and Feeding of Children* (1933), p. 144. The curve representing age-occurrence of new cavities is based on observations of 80 children, seen 3 or 4 times a year, from the ages of 6 to 21, as reported by M. M. Moore, *Ann. Dent.*, Vol. 3, page 77 (1936); *Brief Reviews of Scientific Research*, Vol. 5, No. 1 (January 1938).

In a study of 80 so-called normal adolescent girls from "middle-class" families in California, the subjects were examined at 11.5 years, at 13.5 years, and at 17.5 years of age. Their diets contained only about two-thirds of the recommended daily allowances. The deficiencies were mainly vegetables, fruits, milk, and whole-grain cereal, which would tend to make their diets low in minerals and vitamins. The examinations showed an average of 2 diseased teeth at 11.5 years of age with an increase to 9 diseased teeth at 17.5 years of age. [6]

Something is wrong when teeth which were meant to last a lifetime start decaying shortly after eruption.

At present we are unable to give hard and fast rules for the prevention of tooth decay. Nutrition is an influencing factor, beginning with the nutrition of the mother during pregnancy. Specific nutritional factors have been stressed by different workers at different times, but all workers agree that a diet balanced in all respects is most favorable for the best tooth development.

Boyd and Drain, working with children both in hospitals and in homes, found the following daily dietary to be beneficial to the teeth—1 quart of milk, 1 egg, 1 teaspoon of cod-liver oil, 1 ounce of butter, 1 orange, 2 or more servings of succulent vegetables, fruits, and additional foods as desired by the child with candy only after meals. [7]

Research is being carried on which seems to show a relationship between tooth decay and the eating of sweets. The authors think it is worth while to take note of this and give children less sweets. Candy and sweetened drinks could be eliminated no doubt from the diet to the child's advantage for this as well as other reasons.

One interesting piece of research suggests a relationship between rapid growth and adolescent dental caries (Fig. 8). There is close agreement between the two curves. The cavity curve lags 3 to 4 years behind the growth curve. The authors explain this on the basis that impairment of structure is a cumulative process, and therefore the actual cavity appears later, some time after the rapid growth. In the declining phase of the curve there is a decrease in caries similar to the weight but with a greater lag.

The following quotation is taken from the article, "Is Rapid Growth Conducive to Adolescent Dental Caries As It Is to Infantile Rickets?"

> In the case of rickets, there is a logical explanation of rapid growth as a causative condition. It is known, from histological evidence, that, if growth is rapid and mineral metabolism is faulty, the process of bone calcification fails to keep pace with the growth of the organic matrix of the bone, and more or less severe rickets occurs. If the growth rate is slower and the rate of mineralization keeps pace with the rate of growth of the organic part of the bone, rickets does not occur.
>
> The pathology of dental caries undoubtedly differs from the pathology of rickets, but too little is known about the histology of carious teeth to make it possible to define this difference. However, teeth are bony structures, which require for their development and maintenance most, if not all, of the mineral elements required by bones. Also, the mineralization of both has been shown to be subject to some of the same nutritional and metabolic influences.
>
> These known facts provide some reason for the belief that the period of rapid growth associated with puberty has a causal, and not a chance, relationship to the high incidence of dental caries during adolescence. This raises the question as to why the bones, as well as the teeth, do not suffer at this same time. There is some indication that they do, for it has been reported that osteomalacia is most prevalent during the period of rapid growth at puberty. However, since osteomalacia is of relatively uncommon occurrence, while dental caries has a high incidence, it may be that the teeth, rather than the bones, are the more apparent sufferers because of some peculiar law of body economy.
>
> It is well known that rickets is more apt to occur if the rate of growth is rapid, than if it is slow. This has been observed repeatedly, not only in infants but in experimental and farm animals as well.
>
> Up to now, little attention has been paid to a possible similar relationship between rate of growth and the age-occurrence of dental caries, especially in connection with the period of rapid growth associated with

> puberty. As Moore points out in a recent paper, efforts to control dental caries have been based on observations of children not over 14 years of age, because it has been assumed that by that age the teeth have reached complete development. Moore questioned the assumption that little or no caries before 14 years assures little or no caries after that age, and, as a distinct contribution to this general problem, she has collected data for a group of 80 children, examined three or four times a year continuously between the ages of 6 and 21 years.
>
> It has been suggested that "teeth are probably critical tissues with respect to the supply of calcium and phosphorus, and their ratio," and Hess pointed out that bone is highly favored by the organism as a whole and in times of deprivation is suffered to grow at the expense of other tissues. Moreover, pregnancy provides an example of how the teeth may be affected more seriously during a period of heavy demand for bone building materials.
>
> The new light thrown by Miss Moore on the age occurrence of dental caries may well serve to draw further attention to a critical nutritional need by children during this period of rapid growth between the 10th and 15th years. There is much need for further research, but in the meantime, it would seem proper to recognize that, during this period in the life of the growing child, there is an unusually heavy demand for bone and tooth building materials, which should be met by an adequate diet. [8]

Unpublished research shows a tendency for teeth that erupt before 6 months of age to be relatively poor by the time the child is college age. The condition of the teeth was based on the number of cavities, fillings, and extractions. The teeth were not poor because they erupted early, but the difficulty may be due to a cause similar to the previously mentioned relationship between rate of growth and dental caries. Perhaps with rapid growth the exterior dimension of the tooth is the proper size for erupting but the quality of the tooth is inferior.

Food Needs During School Years

Parents often think that when a child has reached school age his feeding can be left to the child's own judgment or to chance. However, the child's food selection during school years needs as careful consideration as before or the results of good feeding during infancy and pre-school years will gradually fade. As a child grows older it takes somewhat longer for faulty diets to show up. Perhaps this is one reason why parents tend to be more negligent.

How does one meet the demands made by the growth shown in Table 1? Chapters IV and V tell how to meet the requirements for infancy and the pre-school child. Do the school child's needs differ from those of the pre-school child? According to the daily allowances for specific nutrients recommended by the Committee on Foods and Nutrition of the National Research Council, all nutrients are increased in amounts over the pre-school allowance except calcium which remains at 1 gram until the child is about 13 years of age when it increases to 1.4 grams.

The school child's food needs are increased because he is still growing, internally and externally, thus requiring increased protein, vitamins, and minerals. Also, he is often more active during these years than at any period in his life. This calls for a relatively high intake of calorie-high or energy foods which need to be carefully considered qualitatively.

Energy Foods

Energy food is needed to supply fuel for the internal functioning of the body and to take care of the child's external activities; therefore an active school child consumes large quantities of energy foods.

The energy needs of a child of any age vary with his size and activity. No two eight-year-olds would be expected to have the same total energy expenditure. Each individual is a law unto himself; just as we feed the baby and not the formula so do we feed the school child and not the menu.

The younger the child, the greater is the caloric need per pound of weight (Table 2).

This table is to be used as a guide only. The very active child will require somewhat more calories and the inactive or overweight child less than the number of calories stated per pound of weight. There is also a difference in the child's calorie requirement dependent upon his build. Food requirements are somewhat proportional to surface area; therefore, as the body surface increases, so the calorie need increases. As a long, thin radiator gives off more heat than a short, thick one, so a long, thin child gives off more heat and hence requires relatively more calories than a short, stocky one.

Even though the calories per pound decrease with age, there is a steady increase in the total daily calorie intake. This is true for both boys and girls and is explained by their increased weight (Table 2 and Fig. 9). The highest calorie intake for boys is reached at about 18 years of age while girls reach a peak at about 14 years of age. This illustrates the truth of the statement that the adolescent boy often eats more than his father. A very rapid increase in calorie consumption is noted for boys from 13 to 17 years old. Some studies show an even higher daily calorie intake for the adolescent boy than is given here.

A study made by the Russell Sage Institute of Pathology showed the basal requirement of boys to be 25 per cent above that of adults. It was ascertained that growing athletic boys were consuming 4350 calories daily plus 650 additional calories in food purchased at a neighborhood store. [9]

This relatively high energy requirement can be partially met by increasing the consumption of fat. The school child can "handle" a greater amount of fat than the pre-school child. His diet may include added amounts of butter, additional bacon, cheese, nuts, and peanut butter. Since his intake of energy foods is high, it is important to keep the nutritive quality high. Use molasses, brown sugar, and honey in place of white sugar. Do not use dry, powdery, tasteless, lifeless, robbed white flour; replace it with tasty whole-grain cereals and flours. See that your child receives the needed abundance of fruits, vegetables, milk, eggs, and meat. When these essentials have been included in the diet, let him "fill up" with

Table 2. Caloric Requirements of Children of Different Ages

Age	Approximate Caloric Requirements in Health
	Calories per pound
Birth to 1	40–50
1 to 2	40–45
2 to 3	38–43
3 to 4	35–40
4 to 5	34–39
5 to 6	32–38
6 to 7	32–38
7 to 8	32–38
8 to 9	32–38
9 to 10	33–38
10 to 11	33–38
11 to 12	33–38
12 to 13	33–38
13 to 14	32–38
14 to 15	28–38
15 to 16	26–36
16 to 17	24–33
17 to 18	23–30
Adult *	18–24

* Male 150 pounds. Female 130 pounds.

These are the requirements of children at normal weight. Those who are underweight may require twice as much as the maximum and, under proper conditions, can take this amount without digestive disturbance. The large range in number of calories is required on account of differences in activity, power of assimilation, and rate of growth. At any given age the greater the weight the smaller the number of calories needed; therefore use the lower number of calories for the heavier children and the higher for children of less weight. (Adapted from *Pediatrics* by Chapin and Royster.)

nutritious carbohydrates such as potatoes, whole cereals, and whole-cereal breads, bananas, apples, and dried fruits.

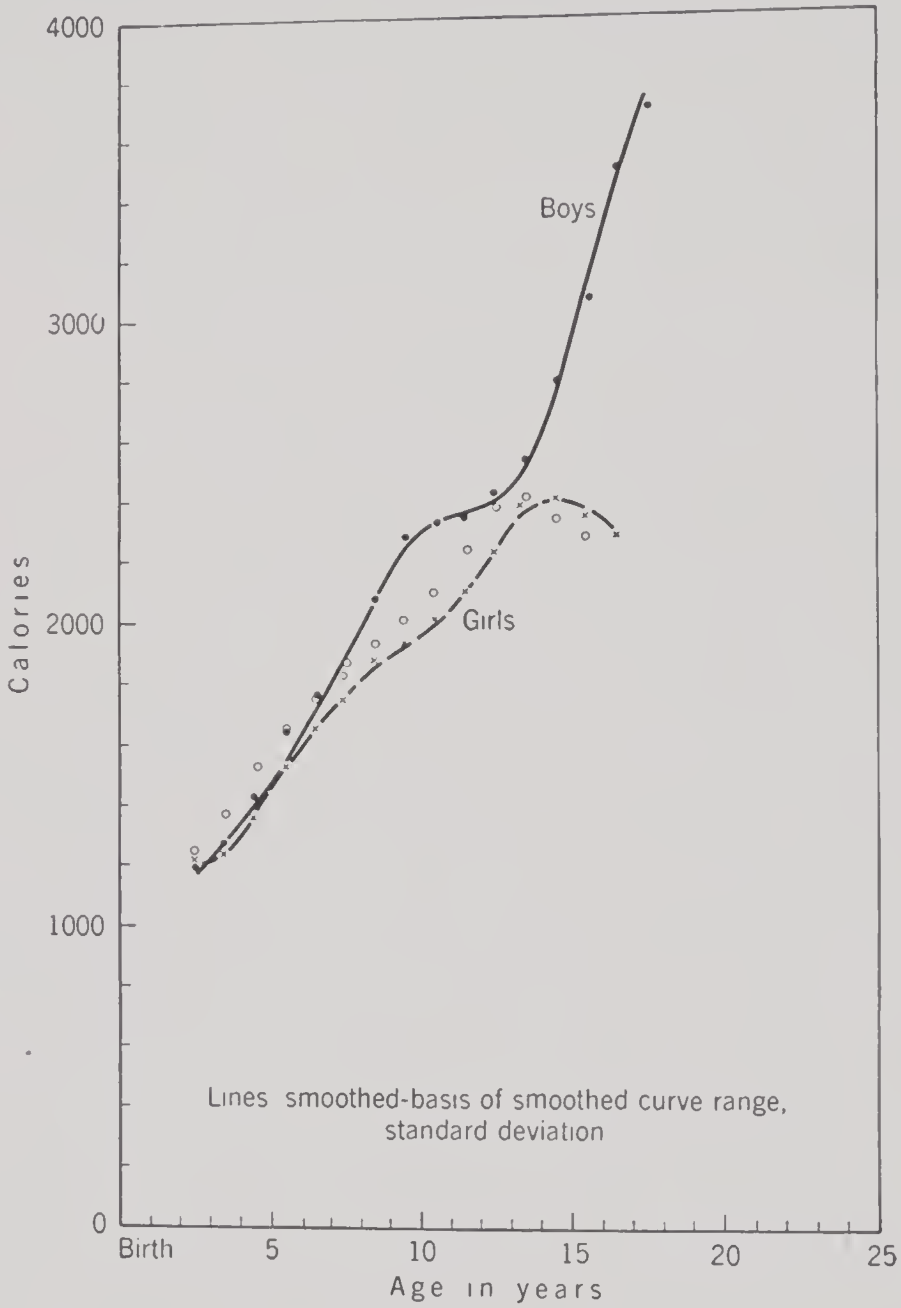


FIG. 9. Average daily caloric intake, by age, for boys and girls. Data from the White House Conference on Child Health and Protection, Growth and Development of the Child, Part III, *Nutrition,* Appleton-Century Co., New York (1932). Based on data from 220 girls, 2–17 years old, and 253 boys, 2–18 years old, assembled from published as well as unpublished data.

Protein Foods

Because the school child is still growing, the body needs a good supply of protein. The child's rate of growth is greatest during the first year of life; therefore the amount of protein per pound of body weight is greatest during that period. Spectacular body changes also take place during adolescence with a resultant high need for protein. Studies of children's dietaries show that the grams of protein per unit of weight gradually decrease as the child grows older. [10] This does not mean that the proportion of protein in the diet is reduced. Studies show 11 to 15 per cent of the total calories of an adequate diet to be protein. [10, 11]

It is important that the protein be of high quality. Milk, eggs, and lean meat are excellent quality proteins and should all be included if possible in the school child's daily diet.

Minerals and Vitamins

All minerals and vitamins discussed in Chapter II are needed by the school child. In fact, their presence is even more important to the school child than to the adult since they affect growth and development.

Food to Meet the School Child's Requirements

Some experimental work has been done to determine the requirements of various nutrients for children of different ages. But more experiments are needed before exact requirements can be stated. The Appendix gives a guide for allowances at different ages.

As with adults, experimental work with children shows a range in nutritive requirements. Consequently we simply mention the foods to include daily. The amounts should be varied to meet the individual child's needs. The daily foods for children, stated in general terms, include 3 to 4 cups of milk, potatoes, two additional vegetables (one green or yellow), a citrus fruit, another fruit, an egg, a serving of meat or fish, whole-grain cereal, and bread and butter. Most children are benefited by the use of cod-liver oil or some fish oil or fat fish in winter, particularly the younger school child. If a fish oil containing iodine is not included in the child's diet those living in the goiter belt should use iodized salt. An ample supply of iodine is particularly essential during adolescence to avoid simple goiter.

Day's Menu for the Young Child

If the above-mentioned foods are included in the school child's daily diet in proper amounts, he should receive sufficient energy, protein, vitamins, and minerals. Give him plenty of simple, nourishing foods. Spices and highly seasoned foods may irritate the membrane of the digestive tract and destroy the appetite for the more bland but highly nutritious foods; therefore they are best omitted from the school child's diet. A day's diet, suit-

Table 3. *Day's Diet for the School Child of 7 to 9 Years*

Food	Amount	Calories	Protein	Minerals		Vitamins			
				Calcium	Iron	A	Thiamin	C	Riboflavin
			grams	*grams*	*grams*	*I.U.*	*micrograms*	*milligrams*	*micrograms*
Breakfast									
Orange	1 medium	75	1	0.039	0.00080	525	117	85	.....
Oatmeal	¾ cup (cooked)	100	4	0.016	0.00120	.....	135	0	26
Toast, whole-wheat	1 slice	75	3	0.020	0.00048	.....	84	0	25
Butter	1 tbsp	100	0	0.002	0.00003	312	.....	..	.....
Milk	1 cup	170	8	0.288	0.00049	268	146	2	549
Lunch									
Bread, whole-wheat	1 slice	75	3	0.020	0.00048	.....	84	0	25
Butter	½ tbsp	50	0	0.001	0.00002	156	.....	..	.....
Bacon	1 slice	33	1	0.001	0.00016	.....	8	0	.....
Egg	1 medium	80	7	0.031	0.00155	500	75	0	165
Carrot strip	½ carrot	11	0	0.011	0.00015	525	15	1	15
Pudding, rice with raisins	½ cup	110	2	.....	....	.....	.....	..	.....
Milk	1 cup	170	8	0.288	0.00049	268	146	2	549
After school									
Apple	1 medium	80	1	0.014	0.00068	128	77	9	51
Raisins	¼ cup	100	1	0.017	0.00087	15	26	..	.....
Dinner									
Salmon, broiled	2.6 oz	150	11	0.007	0.00067	375	85	..	.....
Potato, baked	1 medium	100	3	0.014	0.00108	36	144	16	54
Beans, green	½ cup	21	1	0.028	0.00060	500	38	8	60
Bread, whole-wheat	1 slice	75	3	0.020	0.00048	.....	84	0	25
Butter	1 tbsp	100	0	0.002	0.00003	312	.....	..	.....
Strawberries	½ cup	39	1	0.034	0.00070	.....	.....	50	.....
Top milk	¼ cup scant	100	1	0.049	0.00010	306	15	..	.....
Cookie, sugar	2, 2¼" diameter	100	2	.....	....	.....	.....	..	.....
Milk	1 cup	170	8	0.288	0.00049	268	146	2	549
Total		2,084	69	1.190	0.01155	4,494	1,425	175	2,093
Allowance		2,000	60	1.00	0.010	3,500	1,000	60	1,500

able for the school child of 7 to 9 years and including foods mentioned, is given in Table 3. The older school child will have the same kind of food but in increased amounts. The totals show a sufficient amount of each nutrient with the exception of vitamin D. The amount received would be higher than the total shown since we do not know the amount in some foods or that obtained from sunshine and skyshine. If the child gets sunshine on his body, the vitamin D he receives will be increased; or, if he takes fish oil such as cod-liver oil, the amount of vitamin D will be sufficient.

The vitamin C content of this diet is unusually high. One orange more than meets the seven- to nine-year-old's daily allowance. This diet shows that, while including an orange or tomato is an easy way to meet the vitamin C allowance, these foods are not the only sources of vitamin C. If, however, both the orange and strawberries had been omitted, the vitamin C allowance would not have been met. It should be remembered that vitamin C is easily destroyed by oxidation so that if the food has stood for some time or has been cooked, the amount of vitamin C obtained from it will be lowered.

Adolescence

Adolescence is a period when the child is transformed from a child to an adult, when his whole being changes. This process lasts about 10 years in human beings. Growth and development may do peculiar tricks during this period. Sometimes it goes ahead by leaps and bounds and sometimes it lags. One part of the body may develop more rapidly than some others. Thus we often find a child who has lengthened out rapidly, and while he is becoming accustomed to his new growth, he may feel awkward and ill at ease. He doesn't feel too sure of himself. The boy's voice is changing, and he doesn't know whether he will sound like a child or an adult when he speaks. The internal glands are developing and new functions are being performed. The girl's body fills out and takes on the appearance of a woman. Her need for iron is increased not only by growth of the sexual organs but also by loss of blood through menstruation.

Because of rapid development and glandular changes taking place at this time, children tend to be more sensitive, more easily upset and annoyed than usual. They become more conscious of themselves and tend to become interested in their appearance—in fact, in the appearance of all members of the family. Younger brothers and sisters may be a source of annoyance to the adolescent because of their untidiness. The adolescent child is often critical of the home and the parents. If the parents fail to understand what the child is going through, they may be offended and make a bad situation worse. It is a period when misunderstandings arise easily.

Proper food is exceedingly important at this period. Skeletal growth is rapid and flesh is needed to pad this bony structure (Fig. 7). Adolescents tend to be very active and are growing externally and internally. Therefore growth requires protein, vitamins, and minerals, and activity needs must be met by the addition of many calories (Fig. 9). The adolescent commonly eats more food than an adult of the same size. Because the child eats large amounts of foods, it is well to watch that he does not consume too much roughage. This means including in his diet more of the concentrated foods as butter, bacon, cheese, nuts, peanut butter, molasses, brown sugar, maple syrup, raisins, dates, and figs. In general, those fruits which commonly are dried have a higher sugar and iron content than other fruits.

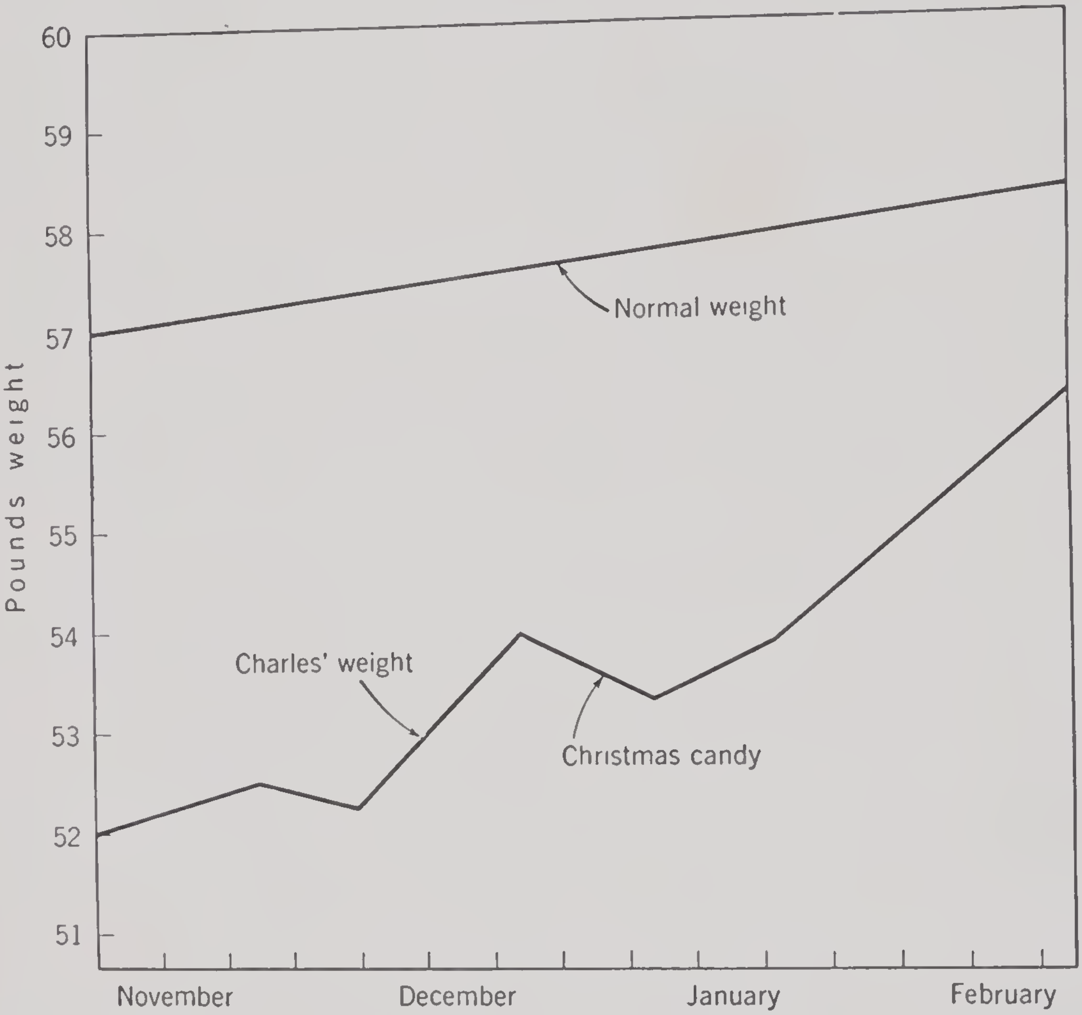


FIG. 10. Too many sweets may interfere with the child's ability to take enough food to grow.

Simple goiter often develops during adolescence. Since this condition can be prevented by sufficient iodine in the diet, it is well to see that the diet of the adolescent contains iodine.

During times of food rationing, as in a period of war, the adolescent may feel the effects of food shortage more than any other age group. One mother relates that during the first World War, when sugar and flour were rationed, she experienced no difficulty in reducing the carbohydrate in her own diet or that of the pre-school child's diet. She did, however, find it difficult to "fill up" the adolescent boy.

The allowance for all food needs is greater for the adolescent than for the younger school child; the greatest increase is for calories (see Appendix). Table 4 shows how the same menu, used for the seven- to nine-year-old, may meet the adolescent boy's needs. The adolescent girl will have somewhat fewer calories than the thirteen- to fifteen-year-old boy (Fig. 9). In order to meet the calorie requirement and still not include too much cellulose, the increased foods are principally butter, top milk, jelly, bacon, and whole-grain cereals. The adolescent boy might have had brown sugar or molasses on his cereal and omitted the jelly for breakfast. The menu is merely given as an example of how individuals of varying food requirements can be fed adequately without preparing separate foods. The adolescent often makes up his calorie requirement by eating chocolate bars, doughnuts, cookies, or cake, but under these circumstances he is less likely to meet his other food needs. Figure 10 shows what happened to Charles when he ate candy every day during the Christmas recess. Charles lost his appetite for foods necessary for growth.

The body cannot be well nourished unless the needed nutrients are supplied. It is the mother's responsibility to see that proper food is prepared and served to her family.

The following meals were given as the food eaten for one day by boys on a high-school football team.

BREAKFAST	LUNCH	DINNER
Pineapple juice Cereal 2 slices toast Milk	Chocolate milk 2 meat sandwiches 2 jelly sandwiches Ice cream 2 crackers	Meat Potatoes String beans Bread Milk
2 eggs Bacon 2 apples Coffee	Toast Coffee	Corned beef Cabbage 3 pieces cake 2 cups coffee
Corn Flakes Milk Cake	5 fried eggs Bacon Cheese sandwich	Chop Suey 2 eggs
Eggnog 3 rolls	1 glass milk 2 hamburgers	Lamb Potatoes String beans 2 glasses milk

This boy had 2 glasses of milk and 3 rolls in the afternoon and a glass of milk at night.

Table 4. Day's Diet for the Thirteen- to Fifteen-Year-Old Boy

Food	Amount	Calories	Protein	Minerals		Vitamins			
				Calcium	Iron	A	Thiamin	C	Riboflavin
			grams	*grams*	*grams*	*I.U.*	*micrograms*	*milligrams*	*micrograms*
Breakfast									
Orange	1 medium	75	1	0.039	0.00080	525	117	85	.....
Oatmeal	¾ cup cooked	100	4	0.016	0.00120	.....	135	0	26
Top milk	½ cup	235	3	0.116	0.00024	720	36	...	.....
Toast, whole-wheat	2 slices	150	6	0.040	0.00096	.....	168	0	50
Jelly	2 tbsp	117	..	.....	....	.....	.....	...	.....
Butter	1½ tbsp	150	0	0.003	0.00005	468	.....	...	.....
Milk	1 cup	170	8	0.288	0.00049	268	146	2	549
Lunch									
Bread, whole-wheat	2 slices	150	6	0.040	0.00096	.....	168	0	50
Butter	1½ tbsp	150	0	0.003	0.00005	468	.....	...	.....
Bacon	3 medium slices	100	3	0.002	0.00049	3	23	0	.....
Egg	1 medium	80	7	0.031	0.00155	500	75	0	165
Carrot strip	½ carrot	11	0	0.011	0.00015	525	15	1	15
Pudding, rice with raisins	1 cup	220	4	.....	....	.....	.....	...	.....
Milk	1 cup	170	8	0.288	0.00049	268	146	2	549
After school									
Apple	1 medium	80	1	0.014	0.00068	128	77	9	51
Raisins	¼ cup	100	1	0.017	0.00087	15	26	...	.....
Dinner									
Salmon, broiled	2.6 oz	150	11	0.007	0.00067	375	5	...	.....
Potato, baked	2 medium	200	6	0.028	0.00216	72	288	32	108
Beans, green	½ cup	21	1	0.028	0.00060	500	38	8	60
Bread, whole-wheat	1 slice	75	3	0.020	0.00048	.....	84	0	25
Butter	2½ tbsp	250	0	0.005	0.00008	780	.....	...	.....
Strawberries	1 cup	78	2	0.068	0.00140	.....	.....	100	.....
Top milk	¼ cup, scant	100	1	0.049	0.00010	306	15	...	.....
Cookie, sugar	2, 2¼″ diameter	100	2	.....	....	.....	.....	...	.....
Milk	1 cup	170	8	0.288	0.00049	268	146	2	549
Total		3,202	86	1.401	0.01496	6,189	1,708	241	2,197
Allowance		3,200	85	1.4	0.015	5,000	1,600	90	2,400

Menus 2, 3, and 4 do not provide these boys with the needed nutrients. Inasmuch as the amounts are not given, it is impossible to say whether they received adequate quantities of food. It is evident that the quality would not be supplied. Such meals, continued over a period of time, would probably be reflected in their health.

If the adolescent boy is unusually active, for example, a member of a football team, his food requirement will be even higher than that given in Table 4. The following menus show how the requirements may be met adequately for the unusually active adolescent boy.

OUTLINE OF MENUS SERVED TO CORNELL FOOTBALL SQUAD

Breakfast:

Fresh Fruit

Cereal (Hot or Cold) with Milk

Two Eggs (All ways except fried)
No Bacon

Toast Marmalade or Jelly

Cocoa One Glass of Milk or Tea
No Coffee

Luncheon and Dinner:

Fresh Fruit, Fruit or Tomato Juice
or
Bowl of Soup

Whole-Grain Bread or Rolls Two Glasses of Milk

MEATS

Steak, Prime Ribs of Beef, Swiss Steak, Pot Roast of Beef, Cube Steak, Roast Lamb, Lamb Chops, Chicken or Turkey, Cold Cuts of Meat, Hamburg Steak

VEGETABLES

All Vegetables and Potatoes except Steamed Tomatoes, Onions, and Sauerkraut *

SALADS

All Fruit and Vegetable Salads with either Mayonnaise or Cream Dressing. No French Dressing. Avoid large amount of Dressing, Onions, Garlic, or Strong Vegetables

DESSERTS

Fruits, Puddings, Blanc Mange, Custards, Tapioca, Gelatin, Ice Cream. No Pie or Pastry

---

* There seems to be no reason for omitting steamed tomatoes, sauerkraut, or strong vegetables from the diet.

Typical Daily Menu Served to Cornell Football Squad

Breakfast:

Orange Halves

Oatmeal with Cream

Two Poached Eggs on Toast

Cocoa or One Glass of Milk — Marmalade

Luncheon:

Pineapple Juice

Pot Roast of Beef, Brown Gravy
Whipped Potatoes — Green Snap Beans

Breads — Two Pats Butter

Floating Island Custard

Two Glasses of Milk

Dinner:

Bowl of Purée of Bean Soup

Whole-Wheat Rolls — Two Pats Butter

Roast Leg of Lamb
Potatoes Natural — Corn on the Cob

Diced Fruit Salad

Chocolate Ice Cream

Two Glasses of Milk

A school child usually lives at home during the early adolescent years, but it is not rare for him to leave home before the end of the adolescent period. The mother should make it her duty to see that her child knows what foods should be included in his daily diet and why. The adolescent is interested in appearance; he wants to be attractive and popular. He wants good teeth, glossy hair, and a clear complexion. Therefore it should be an opportune time to interest him in food and health habits as affecting appearance.

Eating between Meals

The active school child might well ask, "Who started the custom of eating three meals a day?" Was it the physiologist, the physician, the nutritionist, the business man, the schools, or a combination of all? Wild animals eat when they are hungry, providing they can find food. Did the caveman eat three meals a day? To break the fast after a night's sleep seems logical. An evening meal before night, when there will be a long period without food also seems logical. But what about the time between? When man's food was from natural sources such as wild animals, fish, plants, roots, and berries, perhaps there was no logical meal time, except to eat when hungry. Man's chief occupation was to find food. The purpose of a feast was to celebrate good luck in the hunt, but other than that it was customary to eat when hungry or when food was available.

Regular hours for meals undoubtedly arose as a result of group eating, as a matter of convenience and as a result of our highly organized society. Perhaps the physiologist, advocating regularity for the body and a period of rest for the digestive tract, contributed to the idea. Not all people eat three meals daily. Four or five meals are common for some, especially abroad, where meals are low in fat and hence do not "stay by" long enough either for comfort or to supply the needed energy. However, our highly organized society of today requires more or less regularity.

Is hunger a reliable guide for fulfilling the food requirement? If the child comes home from school hungry, why not let him eat? Suppose when he comes home he goes to the kitchen and eats ½ loaf of bread, 5 or 6 cookies, or 3 or 4 doughnuts? His hunger pangs are relieved. Dinner is served at 6:30 and the feeling of hunger may not have returned, but the sight and odor of food gives him an appetite. His intake of food will be smaller because he is not really hungry. The question is one of a choice between the milk, potatoes, meat, vegetables, and dessert of this meal. Too frequently this choice omits the most nutritious foods and includes too many starches and sweets. Now suppose when the child went to the kitchen he had eaten an apple, or an apple and cookie, or a glass of fruit juice and a cookie. These foods also would have relieved the hunger pangs, but in all probability when dinner time arrived, with a restored appetite, he would be ready to eat his whole dinner. The trouble, then, is not the fact that the child eats after school but what and how much he eats. Snacks between meals should be regarded as a legitimate part of the daily food consumption. But if it consists of candy and other sweets, sodas, and pop, it is not contributing much but calories and is dulling the appetite, tending to make for lack of balance in the diet.

The caveman may have eaten "between meals." But he differed from us in that he ate entirely of natural foods; highly refined foods were unknown to him.

We know of no reason why an active child should not eat between meals, providing this "snack" is of nutritious food which does not interfere with food consumption for the following meal. In general, we feel that fruit is a good in-between-meal food. Dried fruits have a higher sugar content and are more filling than some of the other fruits. If a child is very active and fruit or fruit juice is not sufficient, add to it a molasses cookie or give bread and milk, or a molasses cookie and milk, or bread and jelly. Whatever a child eats between meals should be considered in relation to the rest of the day's diet so as to maintain its balance. The amount to be eaten depends on the child. The ever-present appetite is most common in the adolescent years, although children at other ages may need food between meals. Avoid continual piece meals. The school child is growing and is active; his calorie requirement is high. If he needs food in addition to his three regular meals give him the right kind at a specific time.

The School Lunch

A high percentage of the school children of the United States eats their lunch at school. To many this means carrying lunch from home. If we could go down the road and take a glimpse into these lunch boxes, the array of dry sandwiches, cake, and cookies might not seem particularly stimulating to the appetite.

It is a tiring chore at a busy time of the day to prepare one, two, or three lunch boxes before 8:30 A.M. It is no less monotonous for the child to open his lunch box 5 days a week and find the same foods staring him in the face. The noon lunch is a part of the child's daily intake of food and should be planned just as are the other meals. The lunch should be nutritious, attractive, and palatable.

The basic part of a box lunch commonly is sandwiches. There are endless varieties of sandwich materials. Therefore it is not necessary to let yourself get in a rut in making sandwiches. Vary the bread as well as the filling. One school cafeteria found that the children were selecting white bread sandwiches rather than whole-grain bread sandwiches. As an experiment they tried making sandwiches with one slice of whole-grain and one slice of white bread, only to discover that these were the most popular sandwiches of all.

A crisp accompaniment such as celery, carrot strips, lettuce, cabbage, or a mixture of diced vegetables as salad in a covered container add much to the lunch from the standpoint of palatability.

Some liquid should be included in the lunch. This is usually milk, weak cocoa, or a milk soup. If one cannot afford a Thermos bottle, perhaps the liquid should be fruit juice rather than milk. Milk could be included in the form of a custard, pudding, or cheese or could be increased in amount in the meals eaten at home.

Fruit appeals to children and makes the lunch more appetizing. If fresh fruit is too expensive, include a small jar of stewed, canned, or dried fruit.

Most children enjoy some sweet at the end of the lunch. This may be dried fruit, cookies, or cake. If candy is included occasionally, use stuffed fruits, or sweets made from a mixture of ground dates, nuts, and figs.

In summary this means to include substantial sandwiches, a drink, something crisp, and something sweet in the lunch.

Wrap the foods neatly, for a good lunch may not be palatable by noon if improperly packed.

The lunch box requires time and thought in its preparation if you are going to give your child proper food for growth. You expect to spend time and thought preparing a good dinner; why not during that time also think about the lunch box in the same way? Perhaps some of the grinding, chopping, and preparation for the lunch could be done when preparing other meals. The children might help with this, for they often enjoy lunches more if they have participated in the preparation.

Plan the contents of the lunch box far enough in advance so that you will not dread facing the boxes in the morning during a very busy hour. By this method you will prepare better and more varied lunches and your child will be eager to eat them.

The wise mother will see that her child has something he considers interesting in his lunch, some surprise, at least occasionally. Fancy-cut sandwiches or cookies, ground, dried fruits rolled in nuts for dessert, or just an especially attractive napkin. The lunch should be attractive as well as nutritious, one the child will be proud of and that will help make a man of him in more ways than one.

In many schools a warm dish is served to supplement the food brought from home. This adds nutritive value and interest to the lunch. It is beneficial particularly during the cold months. We find many instances where the child's food consumption increases when a warm dish supplements the cold lunch, especially in cold weather. Serving a warm dish tends also to make the lunch hour somewhat more of a social time. It necessitates children's spending more time at lunch, and hence there is less incentive to gobble the food and get out to play.

Teachers and others responsible for planning the school lunch should consider it as a supplement to the child's other two meals and, above all, note its result on the child himself. They should consider the physical condition of each child participating in the lunch and what needs to be accomplished.

The school lunch needs cooperation between teacher and parent. The parent's duty is to send a nutritious, palatable lunch. The teacher can do much in seeing that the child takes time to eat it.

To solve the nutritional problems of the school child after they have arisen is often a matter of interesting the child. During the school years the child should take an interest in caring for himself and should learn to choose his own food wisely. It is important that parents set a good example.

The end of his school years should find the child stronger physically as well as mentally, with good food habits well established. His digestive apparatus should be strong enough to care for all wholesome foods. The period of supervision is now over, he should be allowed to be independent.

REFERENCES

1. L. J. Roberts, *Nutrition Work with Children,* University of Chicago Press, Chicago (1938).
2. L. B. Chenoweth and T. K. Selkirk, *School Health Problems,* Crofts, New York (1938).
3. L. E. Holt, *Food, Health and Growth,* Macmillan, New York (1922).
4. T. B. Robertson, Studies in the growth of man, *Am. Jr. Physiol.,* Vol. 41, page 535 (1916).
5. H. Gray and J. G. Ayres, *Growth in Private School Children,* University of Chicago Press, Chicago (1931).
6. L. M. Bayer, The diet of adolescent girls with special reference to nutritional state and dental caries, *Jr. Pediat.,* Vol. 16, pages 56–68 (January, 1940).
7. J. D. Boyd and C. L. Drain, The arrest of dental caries in children, *Jr. Am. Med. Assoc.,* Vol. 90, pages 1867–69 (1928).
8. Standard Brands, Is rapid growth conducive to adolescent dental caries as it is to infantile rickets? *Brief Review of Scientific Research,* Vol. 5, page 1 (1938).
9. Editorial, The food consumption of adolescent boys, *Jr. Am. Med. Assoc.,* Vol. 67, page 814 (1916).
10. L. E. Holt and H. Fales, The food requirement of children, II, protein requirement, *Am. Jr. Diseases Children,* Vol. 22, pages 371–380 (1921).
11. B. Wait and L. J. Roberts, Studies in the food requirement of adolescent girls, *Jr. Am. Diet. Assoc.,* Vol. 8, pages 209–237, 323, 331 (1932); Vol. 8, pages 403–422 (1933).

CHAPTER VII

FIG. 1.

THE FAMILY TABLE

Contents

- *A.* Who Eats at the Family Table?
- *B.* Planning Meals for the Family
- *C.* Eating Outside the Home
- *D.* Meals for Special Occasions
- *E.* Feeding the Aged

DINNER time at home may be one of the happiest parts of the day for every member of the family, from the father at the head of the table to the mother at the other end with the youngest child beside her. Conversation flows from brother's jokes to father's description of a new type of airplane, from mother's news of a letter from Grandma to the "baby's" attempt at a long word. The food is not discussed; the children eat hungrily and happily and the three-year-old is content with what is put before him, although it may not all be of the variety that the others are eating.

How is such an enjoyable meal time brought about? The mother is not too tired after preparing a meal for five because, although John is not particularly fond of spinach and Mary prefers any soup other than that before her, she has not prepared special dishes in place of them for these two, nor has an entirely different meal been served to the "baby." The mother knows that John and Mary will eat the food on the table without discussion of likes and dislikes, for that has always been expected of them. She knows too that the "baby's" needs are somewhat different from those of her husband and the school children; therefore she has planned a menu that is wholesome and enjoyable for the older members of the family and that with little trouble has been adjusted for the "baby." The cream of corn soup has been strained for the three-year-old, and his dessert is the filling of the custard pie without the crust.

The homemaker who sees her family eating happily, with all the signs of good health, is to be congratulated upon the success she is bringing to her job of building good citizens. Perhaps it is the biggest and most constructive work a woman can do; in Bavaria, they say, "The life of the nation lies in the hand of the housewife." She is the one who plans where, what, and when the various members of the family will eat daily, as well as for the special occasions. It is her responsibility to see that her children know food values before they leave home.

Who Eats at the Family Table?

Who eats at the family table will depend upon each individual situation. Probably the infant will eat most of his meals by himself although as he approaches pre-school age he may have his high chair brought to the family table, first for one meal only and later for the others. How soon he comes to the table must depend on the child and the family. If he is a disturbing element or does not eat well, or if other members of the family cannot refrain from giving him tastes of foods which should not be part of his diet, it is best for him to have his meals by himself. He is usually brought to the table for one of the lightest meals first, probably breakfast.

The same is true of the pre-school child. He may eat 1, 3, or no meals with the family. Study the child to decide when he is ready to eat at the family table. Each family must work out the schedule which is best fitted to its group. Many factors contribute to this decision. The type and amount of food required by the adults as well as the children, the schedule of each member of the family, including social functions as well as work, and finally the mother's ability to meet the numerous demands must be considered. If the homemaker does all her own work, there is a limit to the amount of time she can spend feeding her family. However, if she is willing to spend some time planning and the family is willing to cooperate, a satisfactory plan can be worked out.

Breakfast is the one meal the family usually could have together. It is easier for parents to get up 15 or 20 minutes earlier and not have everyone start the day at sixes and sevens. However, if the father goes to work early it is possible that he may eat before the rest of the family. If he leaves early and the children have lunch at school, an effort should be made to have the family eat together at the evening meal. Meal time with all the family together can be such a happy and instructive time.

Breakfast is usually the simplest meal in any family; it is therefore the meal for which it is easiest to plan one menu that will meet the needs of a variety of ages. Fruit, toast, and a beverage are foods people of all ages can eat. Both cereal and eggs may be served, or one or neither may be served, depending upon the rest of the day's food and the activities of the members of the family. For many families it is a good time to include eggs, especially if some members of the family eat the noon meal away from home. For those who require a hearty breakfast both cereal and eggs may be included. For those members of the family who eat the noon meal away from home, it may be more economical for them to eat a hearty breakfast and buy a light lunch.

The noon meal is the one where the whole family often cannot eat together because some members are unable to be at home. This factor usually determines whether the most hearty meal will be served at noon or at night. School children and fathers whose type of occupation prevents their having a noon meal at home need dinner in the evening. Lunch is probably the most variable meal. The man who does hard manual labor needs a hearty meal at noon as well as at night. For the sedentary worker a relatively light meal should be sufficient. It may vary from a hearty meal to a sandwich and a glass of milk. It is usually a meal that the mother has with the children. The type of food served will depend on the ages of the children. The mother should be able to eat the same food as a child of any age if she takes sufficient amounts.

The child and the family are the factors deciding when the child is ready to eat dinner with the family. If eating with the family is too stimulating and exciting for the young child, he should have his meal by himself even though it means additional work for the mother. Then, too, the mother who has been with small children all day may find it best to feed them early and put them to bed before the older members of the family eat. This might be especially true if there were invited guests. In this case we hope that the father will find some period during the day to spend with the children.

It was found of incalculable help in one family to insist that children were quietly playing when Daddy came home and that there was a 15-minute period during which time Daddy bathed or rested as his need required. But at the close of that period Daddy emerged to be a part of the evening gaiety both during and after the evening meal. This developed an appreciation of each other on the part of both Daddy and the children; no unpleasant discussion was allowed until after the meal; at which time well-fed individuals nearly always had forgotten or forgiven grievances.

It saves time in planning, preparing, and serving meals if all members of the family eat at one time. Even young children's schedules can be adjusted to almost any plan, providing it is regular. The year-old infant in one family of our acquaintance, where both father and mother work, has breakfast with his parents. At noon the child is with a maid and has a light meal of cereal, milk, and fruit. At night he gets his biggest meal and again eats with his parents.

If a maiden aunt, a grandfather, grandmother, or any older person eats at the family table, try to be considerate of their ability to digest food and of their food needs. For a normal oldster this does not mean preparing separate meals, although it may mean some modification just as it does for the infant or pre-school child.

In case of illness or disease it may mean preparation of separate foods for their meals. One family was brought to our attention where the mother was giving the family, including adolescent children, the diet of the diabetic grandmother. The mother's excuse was that if starches and sugars were put on the table the grandmother would eat them.

The type of meals served, the time they are served, and who eats with the group will depend upon the ages, the father's occupation, and the activities of the various members of the family.

One friend, who was a member of a large family, still speaks of how much fun they had around the family table. This should be a challenge to the homemaker. What kind of memories will your children have of their childhood?

Planning Meals for the Family

When planning meals for the whole family the amount of money one has to spend for food is important. Unfortunately, however, a high income does not guarantee an excellent diet.

The housewife needs to study the nutritive value of foods, plan carefully, and market wisely to solve her meal-planning problems.

Table 1 shows some relationship between food expenditure and grade of diet. It also shows that one-fourth of the group making the highest expenditure for food received only poor diets.

Diets were classed as good if the raw food supplied 67 grams of protein, 0.68 gram of calcium, 1.32 grams of phosphorus, 15 milligrams of iron, 6000 International Units of vitamin A, 500 International Units or 1.5 milligrams of thiamin (vitamin B_1), 1500 International Units or 75 milligrams of vitamin C, and 1.8 milligrams of riboflavin.

The diets were graded poor if the raw food provided less than the following quantities of any one nutrient per nutrition requirements: 45 grams of protein, 0.45 gram of calcium, 0.88 gram of phosphorus, 10 milligrams of iron, 3000 International Units of vitamin A, 250 International Units or 0.75 milligram of thiamin (vitamin B_1), 37 milligrams or 740 International Units of vitamin C, and 0.09 milligram of riboflavin.

The diets classed as fair were better than the poor diets in every respect but poorer in one or more nutrients than those classed good.

Table 1. Relationship between Food Expenditure and Grade of Diet, City Worker, United States.

Weekly Food Expenditure per Capita	Records	Good Diet	Fair Diet	Poor Diet
	number	*percentage*	*percentage*	*percentage*
\$1.25–\$1.87	379	1	17	82
\$2.50–\$3.12	672	9	38	53
\$3.75–\$4.37	116	23	51	26
Total	1,167			

Source of basic material: Stiebeling and Phipard, *Diets of Families of Employed Wage Earners and Clerical Workers in Cities*, 1939, U. S. Dept. Agr., Circular 507.

The foods selected by a family vary largely with habit and the availability of certain foods. No two families, even though spending the same amount of money for food, would have the same meals. Milk, fruits, vegetables, meat, and eggs are called high-quality foods because of the variety of nutritive values they supply. After those are included in the diet, one may eat what he wants to fulfill his food requirement. Those families with a liberal amount of money to spend for food will undoubtedly include more meat, eggs, vegetables, and fruits. Those on the lower income will include more cereal foods, dried legumes, and potatoes. The second group should select their fruits and vegetables more carefully than the first since their diet will of necessity contain more limited amounts of these foods. Using natural foods and including as much variety as possible help to balance the diet.

Table 2. Economical Sources and Methods of Using Foods Needed Daily

FOODS TO INCLUDE IN THE DAILY DIET	ECONOMICAL SOURCES	METHODS OF USING
Milk—1 pint to 1 quart or part cheese to substitute	Skim milk and fat with vitamin A added, or dried milk, evaporated milk, Grade B pasteurized milk. Cheese is an economical substitute for part of the milk	As a beverage, plain cold, plain hot as cocoa or with fruit juice, on cereal or in soups, creamed foods, desserts as custards, puddings, frozen desserts. Cheese as such, in sandwiches, casserole dishes, soufflé, omelet, fondue, in salads, grated on vegetables or soups, with crackers or raw apple as a dessert
Potatoes—1 to 2 servings daily	Irish (sweet potatoes in season may be substituted)	Baked, boiled, steamed, parslied, mashed, scalloped, au gratin, in hash or soup
Leafy, green, or yellow vegetables—1 serving daily, raw frequently	Dandelion or any wild green, beet greens, spinach, chard, kale, cabbage, green beans, carrots, winter squash (most green and yellow vegetables when in season)	Buttered, creamed, salads, sandwiches, raw carrot as strips, curled or grated
Other vegetables—1 serving daily when possible	Beets, onions, turnips, lima beans, kidney beans, lentils, dried peas and beans	Buttered, creamed, baked, or soup
Tomatoes, citrus fruit, or some vitamin C-rich food—1 serving	Tomatoes or tomato juice (tangerines, oranges, lemons, and grapefruit at certain seasons), canteloupe and strawberries in season	Juice, sections, halves, salad, fruit cup, sherbets, ices, puddings. Tomatoes may be cooked, canned, or fresh in season
Other fruit—1 or 2 servings (dried fruit once a week)	Apples, usually bananas, prunes, raisins	Raw, stewed, in salad, in pudding, muffins, and cake
Egg—1 daily if possible	Grade B, cracked eggs, storage eggs, dried eggs	Soft-cooked, scrambled, baked, omelet, creamed, poached, soufflé, eggnog, in foods such as custards, puddings, frozen desserts, breads, muffins, and cake
Meat, fish, poultry—1 serving daily (fish and glandular tissue as liver should be included once a week)	Pork liver, heart, tongue, kidney, plate beef, ground meat, shoulder cuts, pink salmon, mackerel	Broiled, baked, boiled, creamed, braised, meat pie, stew, meat loaf, patties, combined with cereals or vegetables
Cereal and bread—use reinforced or whole-grain cereal or bread daily. Use more dark-colored than white flour, bread, and cereal	Oatmeal, cracked wheat, cornmeal, dark farina	As cereals, breads, muffins, cookies, and puddings
Butter or fat with vitamin A added	Tub butter or fat with vitamin A added, peanut butter. Other fats as lard and oils may be used for part of the fat	On bread, in sauces, and in cooked foods

Regardless of whether the family is on a high or a low income the same general menu should fit the needs of all members of the family. The amount of food eaten and the form in which it is eaten will vary. The coarse cereals, fruits, and vegetables will need to be sieved or juiced for the infant and young pre-school child, as well as for any inactive aged person. The parents or any active adult may have such foods as pancakes while the younger child has bread or toast with molasses or brown sugar syrup. The adults may have pie while some members of the family get the filling only. The food requirements for the adults and children of various ages have been given in earlier chapters. The homemaker should be able to make one menu meet the needs of the various members of her family by varying the amount of foods given and occasionally the form in which the food is served.

Following are a week's diets, showing menus which meet the needs of the father, mother, infant (toward the end of the first year), pre-school child, young school child, and the adolescent.

These meals were planned for a family living in a small town. The father taught school and was not home for the noon meal during the week; hence dinner was served at night except on Sunday. The mother did her own work; therefore her energy requirement was moderately high. There were 3 children—an infant 1 year of age, a pre-school child 5 years of age, a school child 9 years of age. A college girl also lived with the family, and ate all her meals with them with the exception of 4 luncheons each week.

Menus for the Family (Liberal Income)
(Baby's food is little different from that of the family)

BREAKFAST	LUNCH	DINNER
Sunday		
Orange, sliced Toast Bacon Eggs Milk Coffee Cream, sugar Cod-liver oil	Carrots and raisin sandwiches Fruit, apples bananas oranges Cheese and crackers Tea, milk	Chicken, roast Potato, baked Broccoli, buttered Tomato (fresh) salad Lemon snow with custard Milk
	For Baby	
Orange juice Toast Egg yolk Milk and cod-liver oil	Cereal Beets sieved (from Saturday) Toast, milk, and mashed banana	Chicken liver and a bone with a little meat, baked potato, broccoli sieved, milk, and lemon snow with custard

Menus for the Family (Liberal Income)—(*Continued*)

BREAKFAST	LUNCH	DINNER
Monday		
Orange juice Ralston Eggs Toast, butter Milk Coffee, cream, sugar Cod-liver oil	Chicken Rice Carrots, buttered Cake Pears Milk	Liver, broiled Potatoes, creamed Beet greens, buttered Tomato, lettuce, celery salad Ice cream Oatmeal cookies Milk
	For Baby	
Orange juice Ralston Toast Milk and cod-liver oil	Egg yolk, rice Carrots, sieved Pears, sieved Milk	Liver, potatoes, beet greens sieved, fresh tomato mashed, toast and milk
Tuesday		
Orange Oatmeal Toast, butter Egg Milk Coffee, cream, sugar Cod-liver oil	Kidney beans Salad, lettuce, tomato, celery Triscuits Ice cream	Beef roast Potatoes, baked Carrots, buttered Apple, celery salad Whipped gelatin with cherries
	For Baby	
Orange juice Oatmeal, sieved Toast Milk and cod-liver oil	Egg yolk, fresh tomato mashed, kidney beans sieved Triscuits and milk	Beef, potato, carrots sieved, milk and gelatin with mashed cherries
Wednesday		
Orange Shredded Wheat Eggs Toast, butter Milk Coffee, cream, sugar Cod-liver oil	Kidney beans Bread, butter Celery Applesauce Oatmeal cookie Milk	Beef roast Potatoes, mashed Green beans, buttered Lettuce salad Bread pudding
	For Baby	
Orange juice Shredded Wheat Toast Milk and cod-liver oil	Egg yolk Kidney beans sieved Milk Applesauce	Beef, potatoes Green beans, sieved Milk Bread pudding

(Bread and butter served at all meals.)

MENUS FOR THE FAMILY (LIBERAL INCOME)—(*Continued*)

BREAKFAST	LUNCH	DINNER
Thursday Grapefruit Oatmeal Egg Toast, butter Coffee, cream, sugar Milk Cod-liver oil	Cheese, tomato, lettuce sandwich Chard, buttered Bananas, sliced Milk	Salmon loaf Potato, baked Peas, buttered Peach and cottage cheese salad Cookies Milk
	For Baby	
Grapefruit juice Oatmeal, sieved Toast Milk and cod-liver oil	Egg yolk, chard sieved, toast, milk and banana mashed	Salmon, potato, peas sieved, peach mashed, and milk
Friday Apricots Toast, butter, jelly Egg Milk Coffee, cream, sugar Cod-liver oil	Salmon loaf cold Broccoli, buttered Carrot strips Bread and butter Peaches, home canned Milk	Ham, baked Potatoes, sweet candied Beet greens, buttered Celery, tomatoes fresh Pineapple upsidedown cake Milk
	For Baby	
Apricots sieved Oatmeal sieved (left from Thursday) Toast Milk and cod-liver oil	Salmon, broccoli sieved, peaches mashed, toast, milk	Egg yolk, sweet potato (baked), tomatoes fresh mashed, milk and pineapple juice
Saturday Orange Farina Egg Toast Milk Coffee, cream, sugar Cod-liver oil	Celery soup, creamed Toast Carrots, buttered Cookies Milk	Tomato juice Meat patties, ground beef, broiled Beets, shredded Chard, buttered Scalloped apples Milk
	For Baby	
Orange juice Farina Toast Milk and cod-liver oil	Celery soup, sieved Egg yolk Carrots, sieved Toast and milk	Tomato juice Beef Chard, sieved Apple, baked Milk

Baby's vegetables were taken from the family pot before butter was added. Toast or a crust of bread made from enriched flour was offered at breakfast time. Sometimes she ate it but not always.

These menus were planned for a week in the fall when celery, broccoli, carrots, beets, beet greens, and tomatoes were still available from their own small garden. This explains their frequency in the diet.

Eggs were served for breakfast because the father and adolescent student were usually away at noon. The baby, being a year old, was on three meals and always ate some of most of the foods prepared for the rest of the family. She was given cereal or egg yolk for breakfast. When she had cereal for breakfast, her egg yolk was included in the noon or evening meal, depending upon the day's menus. Egg yolk, because of the fat content, is often given to infants at the evening meal, especially if they awaken early in the morning. Fat tends to retain food in the stomach a longer period of time and therefore one feels full and hunger pangs are delayed for a longer period. Usually on the days when cooked cereal was not served for breakfast she was given cereal left over from the morning before. Most of her fruits and vegetables were sieved. When the family had pineapple upside-down cake, she had pineapple juice. Cookies, cake, ham, and bacon were omitted from her diet.

Since the father led a somewhat sedentary life, such foods as doughnuts, pie, and pancakes were seldom served.

The whole family ate breakfast together, the infant had her noon meal at 11:30. During the school year the other two children and mother ate at 12:15. The whole family usually ate dinner at 5:30. However, when the father was detained, the children ate before the parents.

Table 3 shows how the amounts of food varied for the members of this family but how each member met his allowance from the same menu.

Table 4 is a market-order form which the homemaker may find helpful. The nutritive value of the meals depends not only upon wise purchasing but also upon proper storage and preparation of the foods after they are purchased or harvested. Spaces have been left for the homemaker to figure the food order for her family.

The week's menus, given on pages 288–290, were based on a liberal income. They include an abundance of milk, eggs, meat, fruits, and vegetables. If one were on a low income, the cost of these same meals could be reduced materially by—

> Using dried, evaporated, skim milk, or cheese for the greater portion of the fluid milk; skim milk should be supplemented with some form of vitamin A to take the place of that removed in the cream; butter, reinforced fat, or fish-liver oil could be used. When evaporated or dried milk is used fairly regularly more thiamin should be included in the diet. If cheese is substituted for milk include more riboflavin.

Table 3. *Amounts of Food Eaten*

Food	Father	Mother	Adolescent	School	Pre-School	Infant
Breakfast						
Orange	1	1	1	1	1	⅖ cup juice
Egg	1	1	1	1	1	..
Oatmeal	..	..	¾ cup	½ cup	¼ cup	½ cup
Brown sugar	..	..	1 tsp	1 tsp	1 tsp	..
Toast	1 slice	2 slices	3 slices	1 slice	½ slice	¼ slice
Butter	½ tbsp	1 tbsp	1½ tbsp	½ tbsp	½ tbsp	¼ tsp
Milk	..	..	1 cup	1 cup	1 cup	1 cup
Top milk *	3 tbsp	2 tbsp	¼ cup	..	..	..
Coffee	2 cups	1 cup	..	..	..	..
Cod-liver oil	..	..	..	½ tsp	½ tsp	¾ tsp
Noon						
Cream of celery soup		1 cup	2 cups	1 cup	¾ cup	¼ cup
Toast	Not	1½ slices	2 slices	1 slice	½ slice	¼ slice
Butter	at	1½ tbsp	2 tbsp	½ tbsp	1 tsp	¼ tsp
Carrots, buttered	home	½ cup	1 cup	½ cup	⅓ cup	¼ cup, sieved
Cookies		2	2	2	1	½ peach, sieved
Milk		1 cup	1 cup	½ cup	½ cup	⅔ cup
Night						
Tomato juice	½ cup	½ cup	½ cup	½ cup	½ cup	⅓ cup
Ground beef patty	6 oz	4½ oz	6 oz	3 oz	2 oz	1 oz
Potato, creamed	¾ cup	¾ cup	1 cup	¾ cup	¼ cup	2 tbsp
Chard	½ cup	½ cup	¾ cup	½ cup	¼ cup	3 tbsp
Bread	1 slice	1 slice	2 slices	1 slice	..	..
Butter	2 tbsp	2 tbsp	1 tbsp	½ tbsp	..	..
Scalloped apple	1 cup	1 cup	¾ cup	¾ cup	⅓ cup	¼ cup
Milk	1 cup	1 cup	1 cup	1 cup	1 cup	1 cup

* With the exception of the adolescent girl the children used part of the milk from their cup of whole milk on their cereal.

Table 4. *Market List for Moderate-Cost Meals*

Bureau of Home Economics, United States Department of Agriculture

Family Members	Kinds and Quantities of Food for a Week										
	Milk[1]	Potatoes, sweet potatoes	Dry beans, peas, and nuts	Tomatoes, citrus fruit	Leafy, green, and yellow vegetables[2]	Other vegetables and fruit[3]	Eggs	Meat, poultry, fish[4]	Flour, cereals[5]	Fats and oils[6]	Sugars, syrups, preserves
	qt	*lb—oz*	*lb—oz*	*lb—oz*	*lb—oz*	*lb—oz*	*number*	*lb—oz*	*lb—oz*	*lb—oz*	*lb—oz*
Children:											
9–12 months	6	0—14	.....	1— 8	1— 8	0— 8	5	.....[7]	0—12	0— 1	0— 1
1–3 years	7	1— 2	.....[7]	1— 8	1— 8	1— 8	6	0— 6	1— 2	0— 2	0— 2
4–6 years	7	1— 8	0— 1	1— 8	2— 0	2— 0	6	0—12	1—14	0— 5	0— 5
7–9 years	7	1—12	0— 2	1— 8	3— 0	3— 0	6	1— 8	2— 2	0— 8	0— 8
10–12 years	7	2— 8	0— 2	1—12	3— 8	4— 0	6	2— 0	3— 4	0—12	0—12
Girls:											
13–15 years	7	2—10	0— 3	1—12	3— 8	3— 4	6	2— 8	3— 4	1— 2	0—14
16–20 years	7	2— 4	0— 2	2— 0	3— 8	4— 4	6	2— 8	2— 8	0—12	0—12
Women:											
Moderately active	5	2—10	0— 3	2— 0	3— 8	4— 0	5	2— 8	2— 8	1— 0	1— 0
Very active	5	3— 2	0— 4	2— 0	3— 0	4— 0	5	3— 0	3—12	1— 4	1— 4
Sedentary	5	1—12	0— 2	2— 0	3— 8	3— 8	5	2— 8	2— 2	0—12	0—12
Pregnant	7½	1—12	0— 2	2— 0	4— 0	4— 8	6	2— 8	2— 2	1— 0	1— 0
Nursing	10½	2—10	0— 2	3— 8	4— 0	5— 0	6	2— 8	2—12	1— 0	1— 0
Boys:											
13–15 years	7	3— 2	0— 3	2— 0	3— 0	5— 0	6	2—12	4— 8	1— 2	1— 2
16–20 years	7	4— 0	0— 4	2— 0	3— 0	5— 8	6	3— 0	5— 0	1— 9	1— 9
Men:											
Moderately active	5	3— 2	0— 4	2— 0	3— 0	4— 0	6	3— 0	3—12	1— 4	1— 4
Very active	5	5— 6	0— 8	2— 0	3— 0	5— 0	6	3—12	7— 0	2— 1	2— 1
Sedentary	5	2—10	0— 3	2— 0	3— 8	3— 4	6	2— 8	2— 8	1— 0	1— 0
....	...	.....	.....	.....	.....	.....	.	.....	.....	.....	.....
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....	...	.....	.....	.....	.....	.....	.	.....	.....	.....	.....
Total	...	.....	.....	.....	.....	.....	.	.....	.....	.....	.....

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[1] Or its equivalent in cheese, evaporated milk, or dry milk. Five ounces of American (Cheddar) cheese, or 1 quart skim milk and 1½ ounces butter, or 3½ ounces dry skim milk and 1½ ounces butter, or 17 ounces evaporated milk are about equivalent to 1 quart of fluid whole milk.

[2] Such as green cabbage, kale, snap beans, carrots.

[3] Such as apples, bananas, peaches, onions, corn, celery.

[4] Exclude bacon and salt side.

[5] Count 1½ pounds of bread as 1 pound of flour. Use chiefly whole-grain or enriched products.

[6] Include bacon and salt side.

[7] The authors believe that well-cooked, strained beans and peas may be given after 1 year of age; also that meat, fish, and poultry may be started from 9 to 12 months of age.

Fewer eggs could be used if the diet included more green vegetables, molasses, and dried fruits for iron.

Reinforced fats could replace butter.

The meat bill could be reduced by using a cheaper cut of beef, as a pot roast rather than rib roast; pink salmon or mackerel for the fish, and fowl in place of roasting chicken.

Less vegetables might be included if they were not available from the garden.

Following is another week's menu for a similar family, on a low income. There is less meat, cheaper cuts being used and the animal protein being supplemented with plant proteins to a greater extent. Cheaper forms of milk are utilized. Less eggs, fruits, and vegetables are included. These diets, however, would meet the daily requirement.

WINTER MENUS FOR THE FAMILY (LOW INCOME)

BREAKFAST	LUNCH	DINNER
Sunday		
Grapefruit, if cheap, or tomato juice Scrambled egg Toast, butter Jelly Milk Coffee Cod-liver oil (for all children)	Fresh cider Split-pea casserole Corn bread Milk	Pork roast Potatoes, baked Apple and cabbage salad Squash, baked Gingerbread with raisins Milk
	For Baby	
Grapefruit or tomato juice Egg yolk Toast Milk Cod-liver oil	Fresh cider Split peas casserole Toast Milk	Squash, potato Apple, baked Milk
Monday		
Applesauce Oatmeal Toast, butter Milk Coffee Cod-liver oil	Carrots, creamed on toast Cabbage salad Prunes Milk	Wheat, ground beef, tomato, onion casserole Graham muffins, butter Apple, baked Molasses cookies Milk, tea
	For Baby	
Applesauce Oatmeal, sieved Toast Milk Cod-liver oil	Egg yolk Carrot, sieved Prunes Milk	Wheat, meat, vegetable casserole Apple, sieved Toast and milk

Winter Menus for the Family (Low Income)—(*Continued*)

BREAKFAST	LUNCH	DINNER
Tuesday Orange or tangerine Cracked wheat, raisins Toast, butter Milk Coffee Cod-liver oil	Navy-bean soup Fat from pork roast Toast, butter Rice pudding (egg, molasses) Milk	Fresh cider Lamb stew Onion, tomato, potato, carrot Home-canned fruit Milk (for children)
	For Baby	
Orange juice Cracked wheat, sieved Toast Milk Cod-liver oil	Bean soup, sieved Egg yolk Toast Rice pudding and milk	A piece of lamb from the stew and the vegetables sieved Fruit, sieved
Wednesday Applesauce Oatmeal Toast, butter Milk Coffee Cod-liver oil	Creamed onion soup Cabbage salad Bread, butter Gelatin dessert Milk	Baked beans Boston brown bread Tomatoes, stewed Peaches, canned or other home-canned fruit Milk
	For Baby	
Applesauce Oatmeal, sieved Toast Milk Cod-liver oil	Soup Toast and milk Gelatin dessert	Egg yolk Tomatoes, toast Peaches and milk
Thursday Prunes Cracked wheat Toast, butter Jelly Milk Coffee Cod-liver oil	Cheese fondue Spinach, buttered Bread, butter Cookies Milk	Tongue or braised kidneys Cabbage, buttered Sweet potato, baked Carrot strips Baked apple Milk
	For Baby	
Prunes, sieved Cracked wheat, sieved Toast Milk Cod-liver oil	Egg yolk, spinach sieved Toast and milk Gelatin pudding (from Wednesday)	Tongue or kidneys, cabbage sieved, potato Apple, baked Milk

WINTER MENUS FOR THE FAMILY (LOW INCOME)—(*Continued*)

BREAKFAST	LUNCH	DINNER
Friday		
Grapefruit	Macaroni and cheese	Pink salmon or mackerel
Cracked wheat	Tomatoes	Potato, mashed
Milk	Bread, butter	Dried peas or lima beans
Coffee	Milk	Carrot strips
Cod-liver oil		Bread pudding, raisins
		Milk, tea

For Baby

Grapefruit juice	Egg yolk	Salmon or mackerel
Cracked wheat, sieved	Tomatoes, toast	Potato
Toast	Baked apple, mashed (from Thursday)	Peas, sieved
Milk	Milk	Bread pudding
Cod-liver oil		Milk

Saturday		
Tomato juice	Split pea soup	Liver
Cornmeal mush	Bread, butter	Onions, creamed
Molasses or syrup	Applesauce	Potato, mashed
Milk	Milk	Tangerine salad
Coffee		Floating island pudding
Cod-liver oil		Milk, tea

For Baby

Tomato juice	Pea soup, sieved	Liver, potato
Cornmeal	Toast	Onion, sieved
Toast	Applesauce	Pudding
Milk	Milk	Milk
Cod-liver oil		

Baby's vegetable taken from the family pot before being buttered. Served with a little milk or top milk. (Bread and butter served with all meals.)

In these menus reinforced fat is used in place of butter, skim milk in place of whole milk, and molasses for most of the sweetening. More green vegetables could be used when garden truck is available. Some vitamin D compound should be used during the winter months, especially for the children.

The week's marketing list for the family can be obtained by using the form of Table 5 or the one on page 297.

The type of meals chosen will depend upon the amount of money available for food. However, the cost of the meals and the nutritive value will depend to a great extent upon thoughtful planning, careful buying, proper storage, preparation, and cooking of the food.

Table 5. Market List for Low-Cost Meals

Bureau of Home Economics, United States Department of Agriculture

Family Members	Kinds and Quantities of Food for a Week										
	Milk[1]	Potatoes, sweet potatoes	Dry beans, peas, and nuts	Tomatoes, citrus fruit	Leafy, green, and yellow vegetables[2]	Other vegetables and fruit[3]	Eggs	Meat, poultry, fish[4]	Flour, cereals[5]	Fats and oils[6]	Sugars, syrups, preserves
	qt	*lb—oz*	*lb—oz*	*lb—oz*	*lb—oz*	*lb—oz*	*number*	*lb—oz*	*lb—oz*	*lb—oz*	*lb—oz*
Children:											
9–12 months	5½	1— 0	......	1— 8	1— 0	.....[7]	5	.....[7]	1— 0	0— 1	0— 1
1–3 years	5½	1— 8	.....[7]	1— 8	1— 4	1— 0	5	0— 4	1— 0	0— 4	0— 3
4–6 years	5	2— 8	0— 2	1— 8	1— 8	1— 8	5	0— 6	2— 0	0— 6	0— 8
7–9 years	5	3— 0	0— 4	1— 8	1—12	1— 8	5	0—12	2— 8	0—12	0—10
10–12 years	6	3— 8	0— 6	1— 8	2— 0	2— 0	4	1— 8	3— 4	0—14	0—12
Girls:											
13–15 years	6	4— 0	0— 8	1— 8	2— 8	2— 0	5	1—12	3— 8	1— 0	1—10
16–20 years	6	3— 8	0— 8	1— 8	2— 8	2— 0	5	1—12	2—12	0—12	0—12
Women:											
Moderately active	4½	4— 0	0— 8	1— 8	2— 0	2— 0	4	1— 8	3— 8	0—13	1— 0
Very active	4½	5— 0	0—12	1— 8	2— 4	2— 0	3	2— 0	4— 4	1— 0	1— 4
Sedentary	4½	4— 0	0— 4	1— 8	2— 0	2— 0	4	1— 8	2— 8	0—12	0—11
Pregnant	7½	3— 0	0— 6	2— 0	3— 0	2— 0	6	1—12	2—12	0—12	0—12
Nursing	10½	5— 0	0— 4	3— 8	3— 0	3— 0	4	1— 8	2—12	0—15	1— 0
Boys:											
13–15 years	6½	5— 8	0— 8	2— 0	2— 8	2— 8	4	1—12	4— 8	1— 2	1— 0
16–20 years	6	7— 0	0—12	2— 0	2— 8	2— 8	3	1—12	6— 0	1— 5	1— 4
Men:											
Moderately active	4½	5— 0	0—12	1— 8	2— 4	2— 0	3	2— 0	4— 4	1— 0	1— 4
Very active	4½	7— 8	1— 0	1— 8	2— 8	2— 0	3	2— 8	8— 4	1— 6	1—12
Sedentary	4½	4— 0	0— 8	1— 8	2— 0	2— 0	3	1— 8	3— 8	0—13	1— 0
Family:											
Two-year-old	5½	1— 8	.....[7]	1— 8	1— 4	1— 0	5	0— 4	1— 0	0— 4	0— 3
Five-year-old	5	2— 8	0— 2	1— 8	1— 8	1— 8	5	0— 6	2— 0	0— 6	0— 8
Nine-year-old	5	3— 0	0— 4	1— 8	1—12	1— 8	5	0—12	2— 8	0—12	0—10
Woman—moderately active	4½	4— 0	0— 8	1— 8	2— 0	2— 0	4	1— 8	3— 8	0—13	1— 0
Man—moderately active	4½	5— 0	0—12	1— 8	2— 4	2— 0	3	2— 0	4— 4	1— 0	1— 4
Total for family	24½	16— 0	1—10	7— 8	8—12	8— 0	22	4—14	13— 4	3— 3	3— 9

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[1] Or its equivalent in cheese, evaporated milk, or dry milk. Five ounces of American (Cheddar) cheese, or 1 quart of skim milk and 1½ ounces of butter, or 3½ ounces of dry skim milk and 1½ ounces of butter, or 17 ounces of evaporated milk are about equivalent to 1 quart of fluid whole milk.

[2] Such as green cabbage, kale, snap beans, carrots.

[3] Such as apples, bananas, peaches, onions, corn, celery.

[4] Exclude bacon and salt side.

[5] Count 1½ pounds of bread as 1 pound of flour. Use chiefly whole-grain or enriched products.

[6] Include bacon and salt side.

[7] If protein is low, the authors believe that strained, well-cooked beans, peas, and peanut butter may be added before 4 years of age. We also give other vegetables and fruits during the 9–12 months period, especially banana, applesauce, and peaches; during this same period we give meat, poultry, and fish.

The order lists suggested allow considerable choice within the different groups of food.

For the low-cost meals a homemaker might use somewhat less potatoes and dairy products than here given and increase the whole-grain cereal products and green and yellow vegetables, or increase the dry beans, fat and eggs. The specific foods selected will depend upon family food likes and the area in which one lives.

Following the market list for low-cost meals is an example of a week's order list for a family of five. According to the average retail prices of foods in 51 cities in 1939, the order list for a family of five would cost about $8.50. These foods would not usually be purchased in one order.

Fresh fluid milk would be purchased daily or on alternate days. Evaporated milk could be purchased by the case. Dried skim milk has the fat removed and keeps if stored in a cool, dry place. These forms of milk are usually more economical than fresh fluid milk and can well be used in cooking. Remember that vitamin A is found in the fat and that skim milk has this removed.

The family in the illustration would use 1 peck of potatoes a week and so would never buy a smaller amount. Since potatoes must be stored, the families with adequate cool, dry storage space will find it easier marketing and more economical to purchase a larger quantity (½ to 1 bushel per person) in the fall to last through the winter.

Dry beans, peas, and nuts can be purchased in quantities to last several months at a time. They keep well if stored in a clean, covered container. Glass jars or tin cans make good storage containers.

Fresh tomatoes should be purchased for present consumption only. Canned tomatoes or juice may well be purchased by the case if the homemaker does not can her own. The family that uses sufficient quantity of citrus fruit and has cool storage space will find it profitable to buy them by the crate.

Fresh leafy green and yellow vegetables deteriorate readily. Therefore they should be used as near the time of harvesting or purchasing as possible. Salad vegetables keep crisp if washed, put in a covered container, and placed in the refrigerator until used. Keep this container clean and dry.

The quantity of other fruits and vegetables, such as bananas, peaches, apples, and onions, purchased at one time will depend upon the size of the family, the perishability of the food, and the storage space available. Most fruits and vegetables keep better if stored in a cool, dry place. Bananas and sweet potatoes, however, keep better at room temperature.

Eggs can be purchased for a week or two at a time if refrigerated. Fresh meat can be purchased for a week if one has facilities for keeping it frozen, otherwise fresh meat should be bought oftener or supplemented with canned, cured, salted, or dried meat. Glandular tissue such as liver, sweetbreads, and kidneys, as well as fresh fish, are best if eaten the day they are purchased.

Many cereals can be purchased in 5-pound packages, and flour in 24½- or 50-pound sacks. This should be stored in a dry place in a covered container.

Butter keeps best in a cool dark place. Heat causes fat to become rancid. Purchase butter in small quantities unless you have proper refrigeration space. Other fats can be purchased in 10-pound quantities, depending upon size of family and refrigeration. A cold cellar makes a good storage place. The fat should be kept in a covered container.

Sugar keeps well. It supplies only calories; therefore insects cannot live on it as they can on cereals and dried fruits. When there is an excess of sugar, it is an excellent plan to buy it in large quantities.

The thoughtful homemaker will have a food reserve to safeguard her family should transportation be "cut off" temporarily or should guests arrive unexpectedly. Foods which are suitable for this purpose are dried or evaporated milk, dry beans or peas, rice and other cereals, and crackers; canned and dried fruit, including tomatoes, canned vegetables, canned or dried meat or fish, and jelly, preserves, or syrup. These are in addition to the staple articles such as flour, sugar, baking powder, soda, salt, tea, coffee, cocoa, and condiments.

Keep your market order up to date by listing foods on a memo pad when the food is nearly gone.

Following are some hints to help in selecting an economical but adequate diet.

Visit and study the food market for prices and quality of food.

Study the labels on cans and packages.

Watch food sales and check whether the prices are really reduced.

Consider homemade versus bakery-made goods.

Consider package versus bulk buying and large quantity versus small quantity.

It is usually more economical to buy canned goods by the dozen or case. It is not always an economy to buy large cans. Sometimes you pay no more for a given quantity when buying in small amounts; also, if the family is small, large amounts may spoil before used. If a can bulges, it indicates spoilage; return it to the grocer.

Skim milk and butter may be more economical than whole milk. One quart of skim milk plus 1½ ounces butter are equal in food value to 1 quart of whole milk. Butter substitutes containing vitamins may be used in place of part of the butter.

Evaporated and dried milk can easily be used in cooking. Dried skim milk is an especially cheap food.

Table 6. High Nutritive Value for Relatively Low Cost

Protein	Minerals		Vitamins			
	Calcium	Iron	A	Thiamin	C	Riboflavin
Beans, navy, lima, kidney	Milk *	Beans, navy, lima, kidney	Spinach	Pork chop	Oranges	Liver, pork
Liver, pork	Cheese	Liver	Liver, pork	Navy beans	Spinach	Milk, whole
Salmon	Molasses	Molasses	Sweet potatoes	Rolled oats	Kale	Spinach
Ground beef	Navy beans	Rolled oats	Prunes	Peas	Cabbage	Cheese, American
Kidney	Greens in season	Spinach	Tomatoes	Potatoes	Sweet potatoes	Sweet potatoes
Tongue		Potatoes	Peas	Bread, whole-wheat	Potatoes	Eggs
Rolled oats		Prunes	Beans	Sweet potatoes	Tomatoes	Salmon
Cheese, American		Ground beef	Peaches	Liver, pork		
Milk, whole *		Egg yolk	Cheese, American	Bread, enriched		
Eggs		Ground wheat	Butter			
			Milk, whole			

* Skim, dried, and evaporated milk are cheaper than whole milk. Vitamin A is in the cream, and therefore skim milk does not supply this vitamin.

This table does not include all economical sources of nutrients. Prices vary in different areas and with the season. It is important to remember that when foods are cooked some nutrients, especially vitamins, are lost. The amount of loss varies with the method of cooking. It would be well for those on low-cost meals to make generous use of navy beans, liver, milk (especially dried, evaporated, and skim), whole-grain cereals, molasses, spinach, and potatoes. These foods are relatively inexpensive and contribute many nutrients.

Using top milk instead of cream saves money. Higher-test milk may be bought for this purpose.

Glandular meat is usually relatively inexpensive and is very nutritious. Many inexpensive cuts of meat take more fuel to make them tender and often there is more waste from bone and gristle. (A fireless cooker reduces the fuel bill.)

Do not discard edible food. When cooking meat, drain off the excess fat and save it for later use.

Compare the food value of the various kinds of bread. Even though the difference seems small, over a period of time it is important since we use a large amount of bread.

Learn the season when different foods are cheapest.

Use green vegetables as soon as possible after picking. Use wild greens when in season.

Cook fruits and vegetables whole and with skins on when possible.

Thaw frozen fruits just before serving.

Juice, shred, or dice fruits or vegetables just before serving.

Cook vegetables in a small amount of water for as short a time as possible; this method retains more of the natural color and flavor. Use left-over liquid in gravies, soup, or vegetable cocktail. Green vegetables, cooked in an uncovered utensil, retain the green color.

Do not use soda in cooking vegetables or fruits.

Homemakers should remember that there is no one food which is indispensable in the diet. The nutrients contained in a certain food may be necessary, but there are always several sources from which they may be obtained. Therefore there is no one list of foods which must be included in the diet for humans. Know food values and plan menus to include all the essential nutrients.

Eating Outside the Home

Food served in places other than the home has a far-reaching effect upon the eating habits of the American people. The influence is greater on the city dweller since he eats more meals away from home than his rural brother. Statistics show that the percentage of meals eaten outside the home varies in cities from 14 to 68 per cent. The latter figure is for a resort city. It is estimated that in the large cities 30 to 40 per cent of the adult population eat at least one meal a day outside the home.

People eat outside the home for two reasons: either necessity or pleasure. Little needs to be said nutritionally for the adult who eats an occasional meal out for relaxation and enjoyment. His problems arise only when he must eat all or most of his meals out or when he must feed a young child away from home.

Ordinarily it is much simpler to feed the family at home, especially when there are small children. There are times, however, as, when traveling, that meals for the entire family, perhaps for several consecutive days, must be eaten outside the home. Some thought should be given the matter of food before one starts on a trip. Will the necesssary foods be available? Will it be wise to supplement with canned foods? Will pasteurized milk be available?

When eating in a strange city, it is best to learn of the most desirable place to eat by asking local citizens. One criterion is the place which is being most patronized.

The meals should be selected with a consideration of the other food for the day. Where will one be by the next meal time and what facilities and foods are likely to be available? It is wise to eat as nearly on schedule as possible and to have the day's meals balanced. There is a certain amount of excitement and fatigue connected with traveling, and poor eating habits will tend to cause digestive upsets. This is particularly true of children.

One will discover that some foods are more difficult to obtain than others. Our national food habits have influenced the foods served in public eating places. One may safely plan to find potatoes, meat, white bread, and pie on the menu. A variety of fruits and vegetables is more scarce. When traveling with an infant or young pre-school child, take a supply of canned foods to use en route. When traveling, even in the summer when there is an abundance of fruits and vegetables on the market, it is not unusual to find them lacking on many menu cards. No doubt the patrons are at fault in not asking for more fruits and vegetables and requesting something other than white bread. A can or two of evaporated milk may be useful. However, if children are not accustomed to evaporated milk, they may object to the taste. The baby should become accustomed to it before leaving home. It is better to go without milk for a meal or two than to use it from a questionable source.

Cafeterias, as a group, offer a greater variety of foods than most restaurants. Tea rooms may not cater to the manual laborer who has a tremendous appetite, but they frequently have foods on their menus which are suitable for children.

Some places try to encourage family patronage by giving favors to children, especially on holidays and Sundays. One place we discovered gave a booklet of stenciled pictures and a small box of crayons to the children. Some places also make a specialty of menus for children. Following are samples of the sort of menus used.

THE CHILDREN'S MENU

This service is for children under 12 years.

LUNCHEON SUGGESTIONS FOR CHILDREN

Soups

Home-made vegetable soup
Chicken alphabet soup
Cream of celery soup

Ready to Serve

Creamed chicken in casserole
Creamed chicken on toast
Little chicken croquette
Hot chicken sandwich
One (4-minute) egg
One poached egg on toast
Combination vegetable luncheon (creamed spinach, carrots and peas, stewed tomatoes, creamed potatoes)
Creamed spinach
Carrots and peas
Stewed tomatoes
Baked potato with cream
Mashed potato with gravy
Creamed potatoes

Desserts

Baked apple with cream
Applesauce
Sliced banana with cream
Stewed fruits (peaches, pears, prunes)
Preserves or jellies
Baked custard mold
Soft custard with cream
Rice pudding with cream
Home-made gingerbread
Home-made animal crackers
Lady fingers Plain ice cream

Bread

Thin whole-wheat or white bread and butter
Thin rye or raisin bread and butter
Graham crackers
Milk toast

Beverages

Orange juice (one orange)
Strained tomato juice
Cocoa Milk
Certified milk—jar

Children's Combination

Creamed chicken on toast
Baked potato
Fresh spinach
Whole-wheat bread and butter
Choice of
Baked apple, plain ice cream with home-made cookies
Milk or cocoa

Adapted from Marshall Field and Company.

CHILDREN'S MENU

MENU SERVED ONLY TO LITTLE GIRLS AND BOYS

Breakfast

Orange juice
Puréed apricots
Applesauce
or
Bartlett pear
Cooked
or
Dry cereal
Toast
Milk or cocoa

Choice of fruit
or
Cereal with cream
Poached or coddled egg
Toast
Milk or cocoa

Choice of fruit
or
Cereal with cream
Poached egg with crisp bacon
Toast
Milk or cocoa

À la Carte

Grapefruit
or
Orange juice
Puréed prunes
or
Apricots

Applesauce
Sliced orange
Bartlett pear

Cereals
One egg, as desired

Luncheon

Vegetable soup
or
Chicken broth
Mashed potatoes with gravy
Milk or cocoa

Creamed chicken in
Mashed potato nest
or
Hot fresh vegetable plate with
Mashed potatoes
Ice cream
Milk or cocoa

Vegetable soup
or
Chicken broth
One broiled lamp chop
Mashed potatoes
Fresh vegetable
Bread and butter
Choice of desserts (listed below)
Milk or cocoa

À la Carte

Grapefruit
or
Orange juice
Puréed prunes or apricots
Applesauce
Sliced orange
Bartlett pear
Cereals
One egg, as desired

Baby soup, cup
Peanut butter and jelly sandwich
Chicken salad sandwich
Potatoes
Ice cream
Chocolate sundae
Preserved fruits
Broiled lamp chop
Broiled small tender steak

Cup custard
or
Fruit jello with cream
Special vegetables:
  Puréed spinach
  Purée of carrots
  Purée of peas
  Strained tomatoes

(Bread and butter, potato and one fresh vegetable served with chop or steak)

Adapted from Union Pacific.

The above breakfast and luncheon menus were printed on colored folders which were cut out in the shape of (1) a brown bear, (2) a Kaibab squirrel, attractively illustrated on the inside pages. One luncheon menu in a 4 by 6 folder was illustrated with small color sketches. This type of attention for children should be encouraged.

Although these menus are usually well suited to children's needs, the mother must help select from them for the young child. The child able to read will enjoy selecting his own meal. Such foods as French fried potatoes, croquettes, and chocolate éclairs occasionally are listed on children's menus but are not recommended for the young child.

When children are eating away from home, try to have them eat on time. Offer them simple, easily digestible foods. Do not urge them to eat. If they are excited or tired, a small amount of food is better than quantities of food. The child frequently knows better than his parents whether he should eat or not.

Often an individual first experiences eating many meals outside the home when he goes away from home to college or to a job. For the individual who has been brought up on simple, well-prepared, well-planned meals, the problem of food selection may be comparatively easy, provided the foods are available and at a reasonable price. We are creatures of habit and tend to select meals like those to which we have been accustomed.

For the individual who has not been so fortunate as to have had well-planned and prepared meals at home, it is a matter of education. When he realizes that food plays an important part in his mental as well as his physical health, he will be willing to select his foods carefully.

Every one should have some understanding of food values before leaving home. He should know what foods to include and why they should be included.

Table 7 should help the person eating away from home to know what foods to select and why to select them.

Table 7. Daily Food for an Adult

Foods To Include Daily	Amount	Calories	Protein	Minerals			Vitamins			
				Calcium	Phosphorus	Iron	A	Thiamin	C	Riboflavin
			grams	*grams*	*grams*	*grams*	*I.U.*	*micrograms*	*milligrams*	*micrograms*
Milk	1 pt	340	16	0.58	0.46	0.0010	536	292	4	1,098
Eggs	1	80	7	0.031	0.11	0.0016	500	75	0	165
Meat	1 serving	200	24	0.02	0.23	0.0048	.....	400	..	350
Fruit, raw	1 serving	55	..	0.025	0.01	0.0007	450	50	40	40
Fruit, cooked	1 serving	110	..	0.01	0.03	0.0005	350	45	Some	25
Potato	1 serving	100	3	0.014	0.06	0.001	36	144	16	54
Vegetables, cooked	1 serving	40	2	0.05	0.04	0.002	3,000	125	Some	80
Vegetables, raw	1 serving	10	..	0.03	0.05	0.0004	1,000	50	20	45
Whole-grain cereal and bread	2 servings	300	11	0.04	0.20	0.002	.....	300	0	75
Butter	1 oz	200	..	0.004	0.	......	624	.....	..	.....
Total		1,435	63	0.804	1.19	0.014	6,496	1,481	80	1,932
Amounts recommended		2,000–3,500	60–70	0.8	1.3	0.012	5,000	1,200–1,800	70–75	1,800–2,700

Sources: *What To Eat and Why.* Courtesy of Alice Blood and John Hancock Mutual Life Insurance Company of Boston, Massachusetts. Nutritive Food Value Chart, Appendix.

Additional food to meet the energy requirement, according to taste, may be selected from the following:

Second helpings of any of the above foods.
Rolls, crackers, or bread.
Salad oils and other fats.
Sugar, jam, and sweet desserts.

The meals at which these food essentials are included in the day's diet vary with individuals.

Breakfast is a good time to eat one of the servings of fruit, whole-grain cereal, and perhaps an egg.

Lunch can easily include a vegetable as soup or salad, a sandwich and milk; for a more hearty lunch, such dishes as baked beans, a cheese dish, or a hearty dessert as pie. A nutritious lunch usually can be obtained from any lunch counter if one knows how to select. Cream soup and sandwiches are usually available.

Many of the daily food requirements can be included for breakfast and lunch. Dinner usually includes potatoes, meat, and a vegetable. If fruit is needed it can be eaten as a first course, a salad, or dessert. If milk is needed it can be obtained as a creamed dish such as soup, vegetable, fish, or meat, as dessert, or as a beverage of cocoa, café au lait, sweet milk or buttermilk.

Menus including the required daily foods are given on page 294.

Learn what foods you need, why you need them, and eat them daily until it becomes a habit.

FIG. 2. The family loves picnics.

Meals for Special Occasions

As social beings, people enjoy entertaining and being entertained. Therefore the family table occasionally should be the scene of a festive meal.

Persons of all ages from pre-school years to old age thrill at the thought of a party. The type of party will depend upon the age of the person for whom the party is being given.

For the pre-school child it is a party to have a friend or two in with whom to play and to eat. The food served should be simple and the play period short enough so that the children do not become too fatigued. Little extras, such as a candle for the table or some little favor or place card, are appreciated by the young child and are much better for him than fancy food.

The child's first party is often to celebrate his birthday. Do not make the mistake of inviting too many friends. We find it a good plan not to invite more guests than the child is years old. That is, one guest when he is one year old, two guests when he is two years old, and not more than four guests when he is four years old.

Ordinarily it is not wise to feed children between meals, particularly with such foods as candy, ice cream, and cake. It is best if the children can be invited to play preceding the noon dinner or before an early, simple evening meal and taken home after the meal.

An elaborate party for pre-school children only makes work for the mother.

Following are a few suggestions of menus for children of nursery-school or school age.

(Noon meal 11:30 to 12:30)

Menu 1

Creamed Chicken on Crisp Toast
Baked Potato
Buttered Spinach—Carrot Border
Whole-Wheat Bread and Butter
Ice Cream Sponge Cake
Milk

(Evening meal 5:00 to 5:30)

Menu 1

Scalloped Eggs
Carrot and Raisin Sandwiches
Ice Cream Oatmeal Cookies
Milk

Menu 2

Creamed Asparagus on Crisp Toast
Crisp Lettuce Sandwich
Lemon or Orange Gelatin with Custard
Sponge Cake
Milk

If the children cannot be invited for a meal, the between-meal party should be very simple:

Birthday Cake (Sponge Cake without Frosting)
Beverage—Orange Juice, Grape Juice, or Other Fruit Juice,
Plain Milk (Cold or Warm)

It is best to keep the food served, even to older children, simple. The centerpiece used, the favors, and even the doilies and napkins can add interest to the party. The centerpiece should be, if possible, non-tippable. The linen, paper, or oilcloth doilies should be such that no one's feelings will be hurt if food is spilled. The form of entertainment can vary also. It need not always be games. In winter a coasting or skating party or a sleigh ride is much fun. In summer going to the lake or having a picnic, cooking the food outdoors, is appreciated. Most children like to help plan their own party. Also, older children in the family can help plan or, even with encouragement, take complete charge of parties for the younger child.

Children, as well as adults, enjoy entertaining their friends. Every child should be allowed some form of entertainment for his friends. Simple parties are less work for the parents and better for the children. For older children popping corn and shelling nuts can form entertainment as well as refreshments.

The homemaker who does her own work might well follow this rule of simplicity when entertaining grownups too. Her friends would much rather be served simple food than have her fatigued from making elaborate preparations.

Feeding the Aged

RABBI BEN EZRA

Grow old along with me!
The best is yet to be,
The last of life, for which the first was made; . . ."

ROBERT BROWNING
From *Browning's Poetical Works.* Courtesy of
Macmillan Publishing Co.

About a decade ago the pre-school years were spoken of as the neglected period. The infant was given plenty of attention, but as soon as he could run about and exert a little independence parents were inclined to "leave him on his own." Then the pendulum swung in the opposite direction and the pre-school years were considered one of the most important periods. Perhaps we have now struck a balance where the child is allowed to develop independence but where his activities are guided to serve to his best advantage.

At present, nutritionally speaking, we might call old age the neglected period. Commonly no distinction is made between adulthood and old age. Old age perhaps deserves more attention now than formerly since the average length of life is greater than in the past. This means a greater number of older people than before, and therefore this more frequently becomes a problem in feeding the family.

FIG. 3. Aunt Janey, 90 years of age, has just finished mowing the lawn.

Experimental work also seems to have neglected the needs of the aged. As the group of older people increases, the need for knowledge of food requirements will be greater. As for any other period the requirements will vary with individuals. However, in feeding individuals of this age group, there is a need for more research to help formulate guiding principles.

There are some facts that are generally accepted regarding old age. Infancy, pre-school age, school age, and adolescence are definite periods in one's life. Just when one becomes aged or old is a different matter. There is no one year of age at which a person is called old. Some persons are older at 50 than are others at 70. A person's previous and present food habits and his physical and mental activity have much to do with how old he seems to be. To stop physical and mental activity causes one to lose interest in life, often warps the mental attitude, and makes a person seem old. Aunt Janey at 90 years of age (Fig. 3) still mowed the lawn, did the chores, read the newspaper and books, liked to converse with people, and therefore did not seem old.

As the years advance there is a slowing down of all the body processes. Most authorities agree that by 40 years of age the slowing-down process is underway. The change, however, is exceedingly gradual. One usually gears his physical activities to this slowing-down process and reaches the period when he would rather watch than participate when strenuous sports are in progress. Fortunately, there are sports and a variety of activities which can safely be indulged in during later life. This is a fact which should not be overlooked. Although common sense is needed in the matter of exercise, it certainly should not be dropped from the schedule of the older person.

Older persons seem to require less total hours of sleep than younger ones, but then they usually need rest periods during the day.

If body processes are changing, if habits of life are changing, what about food requirements? Food requirements, we have learned, are directly influenced by one's activities, internal as well as external. Therefore it seems only wise to reduce the quantity but not the quality of the food consumed as one becomes less active. The amount of so-called "hearty foods" should be lessened; they would include fried foods, rich pastries, and sauces and gravies. One should gradually go back to the simple, easily digested foods of childhood and infancy.

At 70 years of age many an individual may find that he is unable to eat all the foods that he digested easily in younger years. To avoid digestive upsets his diet might be similar to that of the child of early school years.

As one approaches 80 years of age, the "hearty foods" may need to be eliminated entirely. The person's food habits might resemble those of the pre-school child.

At 90 years of age it may be advisable for the person to be on milk, toast, egg, strained fruits, vegetables, and cereals, as in late infancy. He may also need to be fed oftener.

The slowing down of the body processes and the decrease in physical activity mean a smaller food requirement for energy and for repairing body tissue. The amount of reduction depends upon the individual. Even though the food requirement is decreased, the aged person should still be on a balanced diet. Often older persons fear certain foods or have heard that some foods do not agree with them when they lead a less active life. All this tends to make one-sided diets.

Persons of all ages need balanced diets. Older persons as well as people of other ages should be able to get the necessary elements from food. However, if one has been on a deficient diet for years, he may well need concentrates at first to bring him up to normal and then rely on food. If one has had poor food habits and poor health habits for 50 years he can hardly expect to be in the best of health after 50.

The foods to include in the diet of the aging are milk, eggs, fruits, vegetables, cereal, meat, sweets, and fat. Milk and eggs are easily digested and may form the foundation of the diet. The fruits and vegetables may need to be sieved or used as juice for some older people. Meat should still be included in the diet although the amount should be reduced. Sweets and fats are energy foods and, although less energy is needed, a certain amount is required.

Aged persons should eat only easily digested foods. They should learn to take smaller portions than formerly. Chewing food thoroughly tends to satisfy the appetite with a smaller amount of food. Chewing may be more difficult with the new store teeth; hence food should be of the kind that can be easily masticated.

There has been a tendency for older people to continue their former eating habits. This explains why many people put on weight in middle and later life and may also explain many digestive disturbances of this period. As previously explained, additional weight after 30 years of age is undesirable. Hence, for best health in later years, it is necessary to reduce the food intake, as one reduces his activities and to take food in its simpler, more easily digestible form.

CHAPTER VIII

Courtesy of Mary M. Peabody

FIG. 1.

WE ARE INDISPOSED

Contents

- *A*. Keeping Well
- *B*. Much of the World Is Still Ill
- *C*. Minor Illnesses
- *D*. Contagious Diseases of Childhood
- *E*. A Few Do's and Don'ts

Keeping Well

THE WAY TO HAPPINESS IS TO TAKE GOOD CARE OF ONE'S HEALTH. He who knows how to take good care of his health will abstain from taking highly-seasoned food, will reduce his worries, temper his desires, restrain his emotions, conserve his vital energy, spare his words,

> regard lightly success and failure, overcome sorrows and difficulties, remove from the mind illusions, avoid great likes and dislikes, control his sense organs. . . . He will eat only when he is hungry but will not fill himself with food. He will drink only when he is thirsty but will not fill himself with too much drink. . . .
>
> From *Yin Hsien Cheng Yao* (a systematized course of living as to food) by Hu Se-Wei, an imperial physician, and presented to the Mongol emperor (Wen Tsung) in 1330.

The above quotation gives excellent advice for health and happiness. For it is true that when one is well one is more likely to be happy; and vice versa, when one is happy one is more likely to be well. If persons are well nourished they should be better able to resist disease.

One could wish that more people took the same sane attitude toward the health of their families as the parents of one of the authors. They seemed to feel that they, as parents, were at fault if any members of their family were ill. The father frequently remarked that he did not mind how much money he spent for food, but he begrudged every penny that went to the doctors. That the father had nothing against doctors is evidenced by the fact that one of the eminent surgeons of the South was a "best friend" to the entire family.

The family lived in Kentucky. The children spent much time out of doors. Their activities included gardening and caring for numerous pets; and the play equipment they most enjoyed consisted of the acting bars, swings, and the croquet set. A big sealed jug of blackberry cordial was kept on hand to be used in case of dysentery, which was very common in the South. But all ten children grew to manhood and womanhood without having broken the seal on the cordial bottle. On the other hand, the mother used lemons and oranges freely. The children were often given a lemon to suck upon when they seemed indisposed. Oranges were bought by the crate and bananas by the bunch. When one realizes the prevalence at that time of incipient scurvy, maybe this was not too bad an idea. Anyhow, all these were good steps in the right direction since well-nourished children are better able to withstand disease than poorly nourished children.

Much of the World Is Still Ill

That many people are too ill to work is evidenced by the following. As recently as 1940, Dr. Parren, Surgeon General of the U. S. Public Health Service, said that the average child in the United States is sick in bed 7 days of the year, and the average adult 35 days a year. Thirty-five days is more than one month. Furthermore, every day 1 out of 20 of us is too sick for work or school.

Sometimes people have remarked about the fact that children in the slums of large cities seem stronger and healthier than "the children who have had everything." Maybe this is because we have coddled the latter group, have given them too-rich foods, or have overemphasized something that we think is good for them. Moreover, we have kept them with us (adults), have taken them wherever we go in automobiles instead of letting them run and play out of doors.

One of the authors formerly taught at Hull House in Chicago. She remembers watching some of these "poor" youngsters running, playing, and having the time of their lives. Later she was horrified to see them eating orange peels out of the garbage pails. No doubt they were reinforcing their limited diets with vitamins. Again this same author has been horrified in both New York and Chicago at the number of cars filled with children and the number of children at the movies—children who should be running and playing in their own backyards, building resistance to disease.

Much illness is brought about by overzealous parents' practicing too much of a good thing, such as an extreme amount of any one high-quality food to the exclusion of other necessary nutrients. Examples of the results are: (1) spastic constipation which is on the increase since the world learned that bran is laxative; a small amount of bran, the amount found in whole cereals, may help overcome atonic constipation, but when too much is used it may defeat its own aim by causing another type of constipation of the spastic type; (2) mothers learn that milk is good for children, and so they insist on a quart or even more for little tots, to the exclusion of other foods, and then wonder why the child has anemia, eczema, and constipation; (3) mothers have learned that cod-liver oil is beneficial for infants and pre-school children, and thus, if 1 teaspoon is good, they think 3 teaspoons are better—so they give 3 teaspoons, resulting frequently in lack of appetite, and in constipation and eczema. Then there is the mother who is afraid a germ might get near her baby and, instead of building up his resistance, she goes to extremes to try to protect him from germs.

About 5 years ago a young mother brought a beautifully developed eleven-month-old baby to Cornell. The baby had been breast fed 9 months and had been given all other advantages as far as food and physical environment were concerned. When asked if her child walked, the mother's reply was negative. When asked if he crept, the mother exploded with, "No, I wouldn't let my precious darling creep on the dirty floor, would I, precious?" Two years later when we next saw this mother and her "precious darling," he had had one germ disease after another. Perhaps if she had let him live normally, he would have been able to build up sufficient resistance to fight these little germs. But with her overanxiety to keep him from germs, she was defeating her own aims.

Feed your child well and let him live a well-balanced life.

If for any reason his food must be limited temporarily, while overcoming some illness, try to get him back on a balanced diet as soon as possible. If his diet must be limited for long periods, however, look up the composition of the food which must be omitted (see Appendix), and, if he is not able to take other foods to make good the deficiency, ask your doctor about the advisability of vitamin and mineral concentrates.

For example, suppose a child must be on a no-milk diet for months or years. With no milk his diet is likely to be low in protein, calcium, phosphorus, and riboflavin. But perhaps this child can take boiled milk, dried milk, buttermilk, or American cheese; if so, fine. Maybe the child can take whey, which might be low in calcium but would give some excellent protein and probably water-soluble vitamins, though there is no analysis as yet for it. If he cannot take any of these foods, his diet will undoubtedly be low in calcium. He can make up his protein, phosphorus, and riboflavin by increasing the meat and egg in his diet, but if this must be done, a mother should see that his meat is of glandular organs twice a week. In the meantime, ask your doctor about medicinal calcium or try the Bulgarian or Chinese method of increasing daily calcium (see page 9). Always aim to increase slowly the milk in his diet so as to bring the child back to normal.

One adult who is allergic to milk and all milk products except butter went for years from early childhood to adulthood with no milk, cheese, or additional calcium and wondered why her teeth were so poor. Her growth was also quite stunted. If one of the baby cereals, with bone meal added, could have been given to her instead of to the baby who had much milk and did not need it, how much better off both would have been!

Feed your family well-balanced meals; let them lead normal lives and thus prevent some of the unnecessary illness. Try to teach your child to accept illness if he is ill, but do not overemphasize his illness and do not let him use it as a means of getting everything he wants. He will be much happier if not too much attention is given to it. Teach him and help him to play and enjoy life to its fullest as so well depicted in the following poem:

ONE, TWO, THREE!

It was an old, old, old, old lady,
  And a boy that was half-past three;
And the way that they played together
  Was beautiful to see.

She couldn't go running and jumping,
And the boy no more could he;
For he was a thin little fellow,
With a thin little twisted knee.

They sat in the yellow sunlight,
Out under the maple-tree;
And the games that they played I'll tell you,
Just as it was told to me.

It was Hide-and-Go-Seek they were playing,
Though you'd never have known it to be—
With an old, old, old, old lady,
And a boy with a twisted knee.

The boy would bend his face down
On his one little sound right knee,
And he'd guess where she was hiding,
In guesses One, Two, and Three.

"You're in the china-closet!"
He would cry and laugh with glee.
It wasn't the china-closet,
So he still had Two and Three!

"You're up in Papa's big bedroom,
In the chest with the queer old key!"
And she said, "You are warm and warmer;
But you're not quite right," said she.

"It can't be the little cupboard
Where Mama's things used to be—
So it must be the little clothes-press, Granma,"
And he found her with his Three.

Then she covered her face with her fingers,
That were wrinkled and white and wee,
And she guessed where the boy was hiding,
With a One and a Two and a Three.

And they never stirred from their places,
Right under the maple-tree—
This old, old, old, old lady,
And the boy with the lame little knee—
This dear, dear, dear, old lady,
And the boy who was half-past three.

Henry Cuyler Bunner
From *Poems*, Scribner Series of Modern Poets, 1917

Minor Illnesses

This chapter is intended to help mothers recognize some of the minor illnesses and to give suggestions, especially in regard to diets that we have found successful in treating these illnesses. The following discussion will include such illnesses as indigestion, constipation, diarrhea, enuresis, colds, and eczema.

Digestive Disturbances

Some people have the false idea that the spitting up of food and colic in infants and digestive disturbances in children are to be expected as a part of infancy and childhood. That is a serious mistake. A well-nourished, well-cared-for infant or child need not have digestive upsets or colic.

Colic

Colic, a digestive disturbance in infants, may be one of the first ailments mothers meet. In 1928, when one of the authors was asked to give her first radio talk from Cornell, the woman in charge of the mailing room said, "I hope you are going to tell mothers what to do about colic. We have more questions about that than anything else." Fortunately today, since babies who are not given breast milk have their feeding more carefully supervised, colic has practically become a thing of the past. For the benefit of the few mothers whose babies may have this difficulty, however, this discussion may be helpful.

Colic is really a symptom, not a disease. It is likely to be more common in bottle-fed than in breast-fed babies. It is a term used to designate periodic sudden attacks of abdominal pain in infancy. It may be caused by poorly balanced food intake or poor health habits.

Symptoms

The symptoms of colic are:

1. Flatulence due to gas or air in the fundus or lower part of the stomach and in the intestines of baby.
2. Fussy, irritable baby.
3. Baby draws himself up with pain and screams.
4. Skin of face and arms usually red and extremities cold.
5. Baby sleeps poorly.
6. There may be vomiting and sometimes loss of appetite, or baby may be willing to take more food; warmth relieves him temporarily.
7. Stools show disturbance.
8. Before attack, child may be restless, refuse food, and possibly show a "colic grin."

Preventive and Immediate Treatment

Prevention is more important than cure. Prevent colic by:

1. Right feeding; picking baby up, putting him over your shoulder or knees, and patting from time to time during the nursing period.
2. Find cause of the colic and change food accordingly. While cause is being found, relieve symptoms by:
    a. Giving the baby warm boiled water from a bottle.
    b. Placing baby over your knee or shoulder and patting out the gas; keeping baby warm.
    c. Putting a hot pad at the feet and abdomen of the baby.
    d. Giving enema of warm water if *a, b,* and *c* fail.
    e. If severe indigestion, stop all food for one feeding; then give breast milk or boiled cow's milk and boiled water only.
    f. Give warm boiled water before each feeding.
    g. If condition persists, call your doctor.

Indigestion in Childhood and Adult Life

Causes

The causes of indigestion in childhood and adult life are frequently poor food or poor health habits. The fact that an adult's stomach is larger and hence can act as a reservoir and that an adult's musculature is stronger means that, as a rule, an adult's stomach can take more abuse than that of an infant or young child.

On the other hand, frequently an adult or older child is more nervously affected by stress and strain and tends to worry for a longer period of time than does a baby or younger child. Probably all of us as children or college students have gotten nervously upset looking forward to an examination. One of the authors, to this day, can get so nervously excited over an after-dinner speech or other public lecture that it is a waste of good food to serve her a big dinner. If one only dared to say to the waiter, "Bring me a piece of milk toast or a bowl of rice and milk." As with Carlson's cats (see page 80), so it is true with human beings—nervousness decreases digestive secretions so that acute indigestion is likely to result if heavy food is eaten at this time.

Treatment

If adults would learn to give themselves and their children only the simplest and most easily digested liquid and semi-solid foods until the strain of excitement or worry is completely over, they might avoid difficulty. Milk toast, rice, or other cereal, preferably hot, with milk, bread and milk, and strained milk soups and white crackers or toast are all excellent. If fruit or vegetable is desired, it is best taken as fruit juice, tomato juice, or milk flavored with strained vegetable. If indigestion has become acute or severe, it is best to refrain from food altogether for a meal or two and then to take unbuttered crisp toast or white cracker and warm milk or buttermilk, weak tea or weak coffee or non-fatty broth, and nothing else for a day or two.

Sugars are irritating to the lining of the stomach. In fact, sugar is so irritating that people working in sugar factories, we have been told, wear gloves to prevent having sores caused by irritation of sugar on the arms and hands. Sugars also ferment easily. Fat stays in the stomach longer than any other food and retards the flow of gastric juice. Hence sugar and fat should be omitted. Fruits and vegetables, because of their large amount of roughage (cellulose), are likely to be irritating to the delicate lining of the digestive tract. Therefore they should be omitted for a day or two and then introduced slowly as fruit juice and warm vegetable waters, or as strained vegetable soups without fat, or as baked potato without the skin. Later baked apples without skins and fruit sauces may be used. Eggs usually may be used soon after the attack, though at first they should be soft-cooked eggs (poached or boiled), served on dry, crisp toast. After a few days, lean, rare roast beef or broiled steak, fish, oysters, cream, butter, and bacon may be introduced. Only small amounts of food should be taken at one time. It is better to be even a little hungry after a meal than to overeat.

Constipation

Constipation is that condition of the alimentary tract where bowel movements are less frequent than normal; fecal (waste) material remains too long in the intestines or is voided with difficulty. Sometimes the movement is so hard and is voided with such difficulty that it causes blood in the stools, especially in infancy and childhood.

The mother of a six-month-old baby asked for dietetic advice about her baby. She had been told to give the baby a daily enema for every movement until the child toddled and that then constipation would be overcome. The mother tried this until blood appeared in the stools. The movements were so hard and dry that they caused irritation even though a daily enema was given. When diet was corrected, constipation disappeared, and the child, now 12 years of age, has had normal daily movements without the use of a laxative medicine or enema.

A normal stool is usually about the diameter of a twenty-five cent piece and 3 to 5 inches long. It is about the consistency of soft putty or soft molding clay. There is generally about one stool per day and seldom more than two.

A constipated stool, according to Gardner, is similar to a well-formed cylinder; as large as, or larger than, a normal stool. It has the consistency of dry putty.

A spastic stool is abnormal and may be like small marbles or flat like a ribbon, or small like a pencil. It may be either hard or soft. These stools indicate a great deal of spasm in the large bowel [the colon].

Kinds of Constipation

There are three types or kinds of constipation: (1) the atonic or chronic constipation, due to a lazy or inactive bowel; (2) the spastic type, due to irritation or overstimulation by emotional tension, by the use of too much bulk or cellulose, by constant use of cathartics, or by some disease conditions; and (3) the less common organic type of constipation, where an intestinal obstruction may necessitate an operation. Therefore, any chronic case of constipation where there is no interval of normal stools requires a physical examination, for it may be due to obstruction. Consult your physician about any constipation that is not overcome in a reasonable length of time.

Symptoms

The symptoms caused by constipation are a feeling of weight or fullness in the abdomen and a feeling of irritability and drowsiness. There is often associated with constipation one or more other symptoms such as coated tongue, headache, poor appetite, foul breath, lowered resistance to disease, piles, and, particularly in infancy and childhood, failure to gain weight, vomiting, eczema, and sometimes convulsions. Probably many or all of these symptoms are due to pressure on the pelvic nerves and to distention of the intestines and not to toxic products of putrefaction absorbed from the intestines as was formerly supposed. Dr. Donaldson obtained the same symptoms in patients by plugging the rectum with cotton. Symptoms disappeared when the bowels were emptied.

Causes

Constipation may be caused by:

1. Failure to form a regular habit.
2. Lack of stimuli to peristalsis, that is, lack of sufficient organic acids, bulk, and gas-producing foods in the diet.
3. Too little water taken internally.
4. Lack of muscular tone and motor function, which may be attributable to too little thiamin (vitamin B_1) and perhaps also to too little vitamin C or to a general run-down condition.

5. Too little muscular activity, a type of constipation often associated with overweight people who take little outdoor exercise.
6. Too much fat or protein in the diet.
7. Too much roughage.
8. Nervousness.
9. Mechanical obstruction.
10. Frequent use of laxatives or enemas.
11. Sometimes as a result of disease.

Prevention

First, mothers, do not let constipation get started in your babies. If baby's diet is right, there need be no constipation in normal infancy. And if the family is properly fed, there need be no constipation in childhood or adult life.

Second, if a child becomes constipated, look into the diet.

One mother came to ask about her pre-school child, aged 3, saying, "He's been awfully troubled with constipation ever since he was 8 months old. He gets a good diet and I always see to it that he takes 3 teaspoons of cod-liver oil and his quart of milk each day, though he sometimes does not want it. He particularly likes peanut butter, Coca-Cola, American cheese, bacon, spinach, and raw apple. He eats 2 or 3 raw apples a day. He will go 2 or 3 days without a movement, and then will have a very foul-smelling, hard movement. He loses his appetite. He will put off going to the toilet as long as I let him. He always refuses part of his milk and fish."

In analyzing this child's diet, we found:

1. It was too high in protein—1 quart of milk, cheese, peanut butter, fish, meat, and egg (the child was trying to say so by refusing his milk and fish); foul-smelling stool, no doubt, was putrefactive.
2. It was too high in fat—American cheese, peanut butter, butter, and bacon.
3. They lived in an apartment and the child had little outdoor exercise.
4. The mother was trying to give quantities of fruits and vegetables, but with his lessened appetite the child was not taking them.

Advice given was:

1. Keep fat and protein low—no bacon, American cheese, or peanut butter, a very small amount of butter, and only 1 teaspoon of cod-liver oil.
2. Do not urge him to take milk; offer 1 cup of milk with each meal and let the child take only as much as he wants; do not give him soft drinks.
3. Give apples as applesauce or baked apple, or give other fruit once or twice a day.
4. Continue giving whole-wheat bread and cooked vegetables twice a day.

5. Begin each meal with fruit juice or tomato juice until appetite improves.
6. Put child out of doors for more exercise each day.

The result is that the child is fine now and has one good movement a day. Mother puts him on toilet once a day, but he has a movement easily and mother reports that he is off in a jiffy and takes pride in his accomplishment.

Another mother reported that her little girl, 2½ years old, had been constipated since birth—that the movement, when it came after several days, was hard and in dry little balls (apparently "fat-soap stools"). The child was partly breast fed 4½ months. Supplemental feeding was whole-milk mixture. She started cod-liver oil at 1 month of age, giving 1 teaspoon 3 times a day. When the baby had hard dry stools with blood in the stools, she was given mineral oil. Constipation was so severe that the child had convulsions. When the mother brought the child for consultation, she reported that the child gets a "good" diet with plenty of fruits and vegetables, 1 quart of Guernsey milk or part as a special chocolate milk, butter, bacon, and 2 teaspoons of cod-liver oil in winter and 1 in summer. The child had gotten to such a condition that she cried every time she was asked to go to the toilet. When chocolate milk, butter, bacon, and cod-liver oil were taken out of her diet and the child put in the sunshine 1 hour daily, her bowel condition improved, and in 2 weeks she not only was having one good normal movement daily but also was going to the toilet happily.

Therefore watch your child's diet. There is no excuse for constipation in a normal child, and laxative medicines should be tabooed. Food alone can prevent or correct constipation in a normal child.

In discussing prevention of constipation we should, therefore, briefly discuss stimuli to peristalsis. Some foods are laxative, some neutral, and others constipating.

Many people have the idea that there is but one stimulus to peristalsis, which is bulk (bran or cellulose), as found in all fruits, vegetables, and whole cereals. Fortunately, however, there are others that will stimulate peristalsis—the muscular contraction that helps to push food through the alimentary tract. These substances are so closely bound up with the cellulose in our foods that it is difficult to say which is more important in stimulating peristalsis. These substances are:

1. Organic acid—those acids found in foods such as oranges, lemons, tomatoes, rhubarb, sauerkraut, and buttermilk; fortunately for a baby who cannot take much cellulose, his bowels are stimulated by the organic acids formed from sugars and fats.
2. Salts, such as found in grapes, other fruits, vegetables, and whole cereals.

3. Gases, such as formed from foods like onions, navy beans, cabbage, and by fermentation of honey, molasses, and other sweets.
4. Probably thiamin, as found in whole cereals, fruits, and vegetables.
5. Much water is also important in keeping the stool moist.
6. With some adults, fats or oils, such as cream, bacon, olive oil, may also act as a lubricant.

The more laxative substances present in any one food, the more laxative the food is likely to be. Thus cabbage, onions, and navy beans are more laxative than carrots or celery because the first three produce gas as well as contain much bulk or cellulose. Navy beans may be the best of the three because of their additional high thiamin content. Tomatoes, which contain less bulk than some other vegetables, may be more laxative because they also contain an organic acid. It is also because of its organic acid that buttermilk is laxative, while sweet milk is not.

Some people have the erroneous idea that milk, especially boiled milk, is constipating. Milk is not constipating. But sweet milk, especially if pasteurized, is not laxative because most of the lactic acid bacteria have been destroyed by this heat treatment and so are not present to act upon the sugar of the milk (lactose) to produce the organic acid lactic acid, which is laxative. Furthermore, milk contains no cellulose. In fact, sweet pasteurized milk is what one might call a neutral food as far as its effect upon peristalsis is concerned. It contains little or nothing to act as a stimulus to peristalsis and is itself almost entirely digested and absorbed.

Blackberries, on the other hand, are constipating. If you have ever lived in the South, you may have wondered why in all good southern homes it was customary to keep a jug of blackberry cordial on hand. Its constipating effect for use in the treatment of dysentery and diarrhea, so prevalent in the South, was the reason. Bacteria causing fermentation of food are more active in a warm climate. One friend even reported the use of steeped blackberry root as a cure for diarrhea. Raw apples, too, have been found to be beneficial in the treatment of diarrhea. Also, by overpacking the alimentary canal with too much roughage (raw vegetables, fruits, and whole cereals), some conditions of constipation are made worse. Therefore a sane balance of foods is advisable.

Atonic Constipation

This may be caused by one or several of the factors mentioned on page 321, with the exception of numbers 7 and 9.

Treatment

In treating this condition, therefore, we must find the cause in the patient and treat accordingly.

Treatment of Constipation; Atonic Constipation in Infants. Properly fed normal infants are not constipated. Watch your baby and do not let constipation develop.

A breast-fed baby may tend to have constipation. First, if his mother's milk is too rich, he gains fast and may have very light yellow or gray stools which often look like small, dry balls resembling the stools of a dog that has eaten bones, and they are voided with much difficulty. These stools are what have been called "fat-soap stools," and contain calcium salts of fatty acids. The condition needs to be corrected not only because of the discomfort from constipation but also because baby in this way is also losing much of his calcium needed for bone and tooth development. (For treatment of this condition see page 162.)

Second, the breast-fed baby that is gaining slowly and is willing to take much water may be getting too little breast-milk. He may have a very small loose movement at first, resulting later in what looks like diarrhea with many small loose movements—the result of hunger. If difficulty continues, see page 164 for treatment of this condition.

Bottle-fed infants may tend toward constipation if diet is too high in fat or protein or both. Practically all these cases will correct themselves if baby is put upon a balanced diet with decreased fat and protein. Do not use high-fat milk or more than 1½ ounces of milk per pound of baby weight per day. Use with this $\frac{1}{10}$ ounce of sugar per pound of baby weight per day. Milk sugar is more laxative than cane sugar or Dextri-maltose without added alkali or salt. There is no need to use sugars with added laxative salts. The use of part vegetable water as the diluent in the formula is preferable.

Occasionally we may find constipation in an underfed bottle-fed baby, but the modern tendency is to overfeed rather than to underfeed. Putting baby on a balanced formula, however, is all that is needed. (For good diet see Chapter IV.)

Either a breast-fed or a bottle-fed infant can take orange juice or tomato juice or vegetable waters (see page 162) and, after 3 months of age, strained whole cereal.

Either breast- or bottle-fed infants should exercise. Allow them to kick without clothing on or, if old enough, to creep. Passive exercise, that is, massage of the abdomen over the colon is sometimes helpful, but it is better to let baby kick or creep.

A glycerin or soap suppository may be used for 3 or 4 days; this, with a little vocal encouragement as you put baby on his chamber, will help to establish regular habit. The baby should be praised after he has had the movement. Then the suppository may be omitted and words only will suffice. Baby's training for bowel movement may be started as early as 4 to 6 weeks of age by placing the infant on his small chamber, held in your lap with baby's crouching body held firmly against yours. Watch the time that baby is most likely to have a movement and put him on his chamber at that time. If training is begun this early, no suppository, only praise, is necessary. Baby may not know what you are saying, but (like an animal) he recognizes approval in your voice.

The Older Child or Adult. Treatment for them involves these principles:

1. Correct the diet; that is, see that it is not overbalanced with fat or protein, sugar or cellulose. (While sugar will not cause constipation, an overamount of it in the diet limits other necessary laxative foods.) See that the diet contains a fair amount of the foods spoken of as laxative foods; for organic acids use oranges, lemons, tomatoes, rhubarb, buttermilk; for gas production use cauliflower, cabbage, onions, molasses; for bulk use cabbage, cauliflower, onions, spinach, plums, prunes, apricots, whole-wheat bread, and whole cereals. Whole cereals and beans are good sources of thiamin and may be helpful. In fact, practically all whole cereals, vegetables, and fruits are laxative. For a pre-school child avoid too many fruits and vegetables, especially raw fruits and vegetables. One mother of an overweight but otherwise normal three-year-old with a healthy appetite reported that she thought she could reduce the child's calories with more fruits and vegetables but produced a condition of spastic constipation—the first constipation the child had ever had.
2. Drink plenty of water, particularly before breakfast and with meals.
3. Get plenty of active exercise or play, preferably out of doors. Massage of the abdomen over the colon is sometimes helpful.
4. Suppositories of glycerin or a mild soap may be used for 2 or 3 days until a daily habit is established.
5. Avoid emotional fatigue, loss of sleep, and worry. Do not let a child get tense over bowel movement. One child cried because, "I'll be sick if I don't have a movement," he said. A day or two without a movement occasionally may be normal for individuals.
6. Set a regular time each day when the child or adult goes to the toilet for his bowel movement. With most children and adults the best time is immediately after breakfast. If not then, watch your child and see what is his best time and keep it up. If the little child has no toilet or toilet chair of his own and if his small toilet seat does not have a place for his feet, put a box or stool up in front of him so that his feet can have support.

Spastic Constipation

The spastic type of constipation is a hypertonic condition of the musculature of the transverse and descending colon.

Causes

Emotional tension, constant use of cathartics, or the eating of excessive roughage may cause spastic constipation. The spastic type of constipation has been said to be on the increase. There are several reasons for this. Many people of today are living at a rapid pace and are undoubtedly becoming more tense and nervous. Also they have frequently become too conscious of their alimentary tract and tend to fill it with bran or cathartics for every movement. The spasmatic contraction thus brought about has little value in sending food onward. In fact, the contraction temporarily blocks the passage of food and the contracted colon may come to feel almost like a solid cord beneath the abdominal wall.

Treatment

As this condition is brought about by emotional tension, cathartics, and harsh foods, the treatment quite naturally involves elimination of these conditions as far as is possible. One can, of course, stop cathartics. One can have a bland diet. Just how far one can relieve emotional tension depends upon the individual concerned. It is easy enough for some one to tell you to "take life easy," to "stop your mad pace," but how far you can do it and how far you are willing to do it depends upon you.

A bland, non-irritating diet is helpful. For laxative effect in this type of constipation one should depend upon the organic acids—of orange juice, tomato juice, acidophilus milk, or buttermilk. If they seem too irritating, they can be taken with milk, eggs, or gelatin—as snow pudding or Bavarian creams, cream soups, acid milks with orange or lemon juice—or simply by drinking some milk and then some orange juice. Thiamin will be obtained from strained whole cereals—Rolled Oats, Rolled Wheat, Pettijohn, or Ralston. One should take much water. He may be able to take bacon, cream, and perhaps olive oil if it helps, though usually much fat is not too well tolerated. Sweets for fermentation will be limited to orange juice, banana, and cooked fruits such as apples (without skin), apricots, prunes, pears. Eggs may be used freely. Since some foods must be eliminated, use especially nutritious meats, such as glandular organs, oysters, fish, and chicken. Vegetables will be mild-flavored and cooked. Condiments (pepper, spices, vinegar) will be omitted.

Diarrhea

Diarrhea is a condition in which a person voids frequent loose, mushy or watery stools. Stools are hastened through the alimentary tract so rapidly that even water does not have time to be absorbed.

In infancy and sometimes in childhood a sudden onset of diarrhea is very likely to be preceded by indigestion and vomiting, though diarrhea may come on more gradually without vomiting. Older children and adults are less likely to have diarrhea accompanied or preceded by vomiting. There may be no fever, or the temperature may be moderately high. Young infants may show by facial expression that they are in pain. If temperature is above normal, that is, if the infant is feverish, your doctor should be called at once.

Causes

Diarrhea is a common symptom of many diseases. Sometimes it is primarily of food origin, but at other times it may be associated with more serious diseases such as celiac, colitis, or dysentery.

Acute diarrhea, coming with severe symptoms usually lasting for a short time only if properly handled, is due, as a rule, to indigestion or infection. It may be caused by:

1. Overfeeding.
2. An improperly balanced diet of too much carbohydrate, too much fat, too much protein, too much mineral, or too much bulk.
3. Raw milk, resulting in lactic acid fermentation and mechanical irritation due to large, hard protein curds.
4. Spoiled milk or other foods often resulting in bacterial toxins.
5. Nervousness.
6. Excess or repeated use of cathartics.
7. Infections such as tonsilitis, otitis, or pneumonia.
8. Certain organic diseases, especially those of the heart, kidneys, liver, and pancreas.
9. Underfeeding causing hunger stools of a diarrheal nature (see p. 164).

Extremes of temperature seem to aggravate the condition. During hot weather the condition is more disturbing than during the winter, first, because bacteria (often responsible for the diarrhea or for aggravating it) thrive best in warm weather; second, because the child's (especially the infant's) tolerance for food is decreased in summer; third, because an infant or child is more easily dehydrated (necessary water removed from his system) in hot weather than in winter. Diarrhea carries off much water because of rapid peristalsis. Perspiration also carries off water.

Treatment—General

In treating acute diarrheas one should remember that a condition of diarrhea means that peristalsis is more rapid. Therefore cathartics and all foods which act as stimuli to peristalsis should be omitted from the diet until the condition clears up. (See page 323.)

No matter what the cause of the diarrhea, omit all fruits, vegetables, and whole cereals because of their bulk or cellulose, and minerals. Omit all fruit juices, fats, and oils. Bacteria acting upon foods are likely to produce organic acids and gases. Therefore all foods given should be boiled. Boiled, cool (not cold) water should be given frequently. The diet should consist of boiled, bland, non-stimulating foods such as milk and rice.

Milk used should be from a sanitary source. Check with your dairy and with others using the same milk to see if they and their children have been affected. Sweet milk used should be boiled.

The patient should be kept at a comfortable temperature, in a quiet room, and with only those calm, sane personalities around to whom he will not react nervously. Often even a new nurse, especially one who does not understand children, may unduly excite him. For school children, a strict teacher, a noisy school room, or an examination may have the same effect.

If the condition does not respond promptly after this treatment, your doctor should be called.

Diarrheas Related to Feeding

If diarrhea is the result of unwise feeding, a mother should be able to diagnose the cause and by its removal stop the diarrhea. Acute diarrhea, if allowed to continue, may become chronic.

Overfeeding

Overfeeding may be the cause of diarrhea in either breast-fed or bottle-fed infants or in older children. If parents correct the diet of a baby who is gaining too fast (see gains in weight, page 142) and who is spitting up his food, diarrhea of this type could be avoided. If the infant or child is on a balanced diet, this condition usually does not occur. Overfeeding is more likely to result in diarrhea in hot weather, when energy demands are not as great and when the infant's and child's food tolerance is lowered. For the infant, lengthen the interval of feeding to 4 hours, allow the breast-fed infant only 5 minutes at each breast, and offer plain boiled water before feedings. Omit solid foods. For the bottle-fed baby, calculate the amount of formula (see page 175) and give him sufficient formula to meet his needs. Omit all solid food for a day or two and use Dextri-maltose No. 2 or dextrinized flour as the only carbohydrate.

When the diarrhea improves, either a breast-fed or a bottle-fed baby, over 3 months of age, may be given well-boiled rice or Cream of Wheat. The cereal may be given once a day with boiled skimmed milk or part of the formula. The amount to be given will depend upon the age of the baby (see page 185).

For the older child, allow a period of 2 or 3 meal times to pass without any food. Then follow, if condition improves, by a meal of boiled rice and boiled (preferably skimmed) milk. In some cases peeled raw apple is helpful.

Plenty of boiled cool water should be given to infants as well as to older children. Water is needed to make up for that lost in the stools.

Protein As Cause of Diarrhea

Fortunately, in a normal infant, an excess of protein is less likely to cause diarrhea than is an excess of any other nutrient. An excess of protein in a diet, though, tends to putrefy, giving stools of dark-brown color with foul odor. Artificially fed infants, given more than 1½ ounces of raw cow's milk per pound of baby weight per day, may pass large, amber, beanlike curds in stools. The use of boiled milk (1½ ounces per pound of baby weight per day) in the preparation of the formula will help to prevent as well as to cure this condition.

An older child, on the other hand, may develop diarrhea from improper digestion of protein, especially if it is overfed. The stools are loose, brownish, foul smelling, and may even show undigested meat fibers. In cases of this kind the amount of protein should be decidedly restricted. For 2 or 3 meals the child should have nothing but boiled water. Then he may have well-cooked Cream of Wheat or rice with cream. Buttermilk should be the only protein. The buttermilk, though usually more laxative than sweet milk, introduces fermentative bacteria to help counteract the putrefactive bacteria which cause the difficulty due to high protein. Protein food is needed for building and should not be omitted from the diet of the infant or young child for more than a day. As the condition clears up, other foods should be introduced gradually—white toast, well-baked potato, then milk toast, and thus slowly back to normal.

Carbohydrates and Fats As Causes of Diarrhea

Excessive Fat. In a high-protein diet excessive fat tends to form fat-soap stools. Such high-fat foods include rich mother's milk, rich cow's milk, and too much cod-liver oil (see page 183). If this condition is allowed to continue, especially if fermentable carbohydrate is contained in the diet, a fermentative diarrhea may lead to digestive upsets with vomiting and loss of weight. This condition may be prevented in a breast-fed baby by feeding both breasts more frequently, perhaps every 2 hours, but only for half the length of time at each breast that it normally takes the infant to empty the breast. The last of mother's breast milk (the strippings) contain the most fat. A normal infant more than 3 months of age may also be benefited by giving strained, refined cereal with boiled skim milk 2 or 3 times daily. If necessary to omit the strippings, it may be advisable to supplement the feedings with boiled skim milk until the condition has subsided. Dilute the skim milk before boiling with an equal part of water.

The infant artificially fed on a formula of milk and sugar may develop a fat diarrhea from too-rich milk, too much cod-liver oil, or the addition of egg yolk to a diet already high in fat because of rich milk, or 2 teaspoons of cod-liver oil a day. If high-test milk must be used, remove 2 ounces of cream from the quart. The stools may start as fat-soap stools (see page 162) which, if the diet is not corrected, may become loose, acid in reaction, and contain small particles of fat either as fat curds or even drops of oil on the surface of or mixed with the stool. To prevent this condition, see (1) that milk of high-fat content is not used in making baby's formula, (2) that cod-liver oil is not increased too rapidly (see page 183), (3) that egg yolk is not introduced into a baby's diet which already is too high in milk fat or cod-liver oil. To correct the condition, give the baby only plain boiled skimmed milk, diluted according to his age, for a day or two until movements are reduced in number; then return slowly to his normal formula of whole milk.

The older child, if fed too much fat, may develop a fatty diarrhea with whitish, frothy stools, associated with vomiting, fatigue, loss of color, and loss of weight. To prevent this condition, do not let the little child taste fat-rich foods such as pie crust, doughnuts, fried foods, cheese, and nuts, keep the amount of bacon and butter he gets at a minimum, and do not give him milk of high fat content. If the diarrheal condition occurs, omit a meal or two to help him return to normal more quickly. For the third meal and until fat tolerance returns, give a diet of very little fat, such as milk toast made of skimmed milk, white toast and no butter, or rice or Cream of Wheat and boiled skim milk.

Excessive Carbohydrate. A breast-fed baby never has fermentative diarrhea from excessive carbohydrate and, since bottle-fed babies are usually being fed boiled milk instead of raw milk, fermentative diarrhea is far less common in recent years than formerly. Boiling the milk destroys those bacteria which act upon the carbohydrate and cause the diarrhea. When more babies were breast fed for 3 to 9 months and then fed raw (unpasteurized), cow's milk, diarrhea of the second summer was something that many mothers of that day still remember because it was so common. The second summer may be a disturbing time because adults frequently give children foods for which their digestive systems are not ready.

The stools in fermentative diarrhea are frequent, frothy, usually greenish in color, acid in reaction, sour smelling, and very irritating to the baby's skin. In an artificially fed infant on an unbalanced diet, excessive carbohydrate may be the cause. Or an excess of any sugar may cause diarrhea. Prevent this type of diarrhea either by breast-feeding your baby or by putting your baby on a balanced formula (see pages 171 to 178). If diarrhea of this type occurs, it is well to give plenty of boiled water and, at feeding time, a bottle of boiled skimmed cow's milk with no sugar. The amount in the bottle will depend upon the size of your baby (see page 172). The baby should have no other food until the diarrhea is corrected.

The older child may also have fermentative diarrhea from excessive carbohydrate or fat. This is most likely to occur in hot weather not only because a child's tolerance is lower and because he may need and can utilize less energy foods but also because parents frequently allow more candy, ice cream cones, and the like, at this season. Prevent this condition by using sanity in feeding your child. Do not give him candy, soft drinks, ice cream cones, and cookies between meals and do not permit friends and relatives to give him any. If a child develops this fermentative type of diarrhea, give no food but plenty of cool (not cold) water for a day. At bedtime try feeding him plain boiled rice and boiled skimmed milk. The following day introduce raw peeled apple and milk toast. Then if condition has improved, return him to normal food, but with restricted sugar until the child is completely recovered.

Too Much Mineral and Bulk

An infant under 1 year of age seldom has diarrhea from excessive salts and bulk. Diarrhea occasionally is caused by mineral salts used as a laxative medicine, a cereal, or a sugar with added mineral, or as too much strained vegetable or fruit. Diarrhea may also result when unstrained vegetable or unstrained fruit are given at too early an age. This last procedure is too common in early pre-school days because of the modern tendency for chopped foods and also because adults too often like to try out new foods on the toddler. At this age a child is getting into everything and, unless watched, other indigestible roughage may be swallowed.

With the older child or adult, on the other hand, unless one takes washed bran, he seldom takes too much bulk unassociated with his regular food. In fact, the diarrhea so frequently attributed to eating too many raw apples or other fruits is probably caused by increased bulk, increased organic acid, and increased minerals. The way to correct it is to eliminate temporarily all fruits, vegetables, and whole cereals, and to take only boiled rice and milk or milk toast and much water for one day. During the next few days return gradually to solid food by way of strained cream soups and bread, egg, meat, and the softer vegetables such as well-baked potatoes and mashed carrots.

Underfeeding

Underfeeding is rarely the cause of diarrhea. Under the subject of breast feeding we have discussed the breast-fed infant who voids hunger stools. These stools, coming frequently and of a greenish color, are sometimes mistaken for diarrhea and are made worse by the above described treatment. If a breast-fed baby gaining slowly takes water freely, the interval of feeding should be shortened to 2 or 3 hours and baby given both breasts to prevent underfeeding. If a breast-fed baby, not gaining weight, crying before feeding or hanging for a long period at the breast, shows these hunger stools, correct with proper feeding (see page 164). The bottle-fed baby might also be underfed and develop starvation or hunger stools. Study his gain in weight (see page 142) and evaluate his feeding (see pages 171 to 178), correcting it accordingly. This is all that is necessary if starvation is the cause. This condition is not likely to prevail in older children or adults.

Enuresis

Enuresis is not a disease, but it is a symptom of something wrong either physically or mentally. It is divided into two forms—nocturnal (only at night) and diurnal (only in the day). This last form is usually combined with the nocturnal. If, after 2 years of age, the child still wets his clothing or bed clothing, enuresis may be said to exist.

Treatment

Having ruled out unusual causes by a thorough medical examination, the mother will, in the meantime, be trying to correct home conditions of nervousness, food, and fatigue. She will try to see that the child's general hygiene and method of life are carefully planned. She will give him a simple, non-stimulating diet, free from spices and sweets, with a light supper. She will give him little milk, fruit juice, or other beverage and very little water at the evening meal. She will avoid all mental overwork and undue excitement for the child especially near bedtime. She will see that he has plenty of sleep in a well-ventilated, quiet room and has light bed covers. She will see that he is bathed daily and spends much time playing out of doors with young friends, but without overfatigue. The child should be awakened and taken up late in the evening and early in the morning to avoid trouble during the night. He should not be punished, but the mother should get his cooperation. Scolding, ridicule, or whipping only make matters worse. Suggestion plays an important role. Make the child believe you have confidence in him to overcome this difficulty. Do not humiliate him before others. Do not discuss the subject with others in his presence.

Causes are varied, and usually more than one may be present in any one case. Treatment should be carefully selected according to the cause. The condition, in a sense, becomes a habit; hence perseverance is necessary long after causes are removed.

No doubt the most important factors in treatment are: (1) to see that the child is living a normal, healthy life with simple food; (2) to rule out worry or fear on the part of the mother; (3) to find out what is worrying the child and correct it; (4) to get his cooperation and interest in making an effort to overcome this condition. In fact, let him realize that you are not worried because you know it is his problem and that he can and will overcome it. Taking him up, awakening him thoroughly, and putting him on the toilet at 10 P.M. and early in the morning is also helpful.

Often enuresis starts with the coming of a second child. This is quite disturbing to a little tot, especially if he has been an only child and up to this time has been receiving all the attention of his devoted parents. The new baby naturally must receive more attention than his older brother. Besides, everyone who comes in comes to see the new baby. They bring the new baby gifts. His older brother, therefore, often feels greatly neglected. He does not understand it, and all too often no one tries to do anything about it, or they may do worse by teasing him, or telling him "your nose is out of joint," or "now mother has a new baby." He has just had an emotional experience (perhaps his first) of being left with relatives or friends while mother was in the hospital. And now, when she returns, she brings with her this "usurper." It is not unusual, therefore, for a condition of enuresis to start at this time. If people could realize what this feeling of instability may do to these youngsters, some enuresis could be prevented. Let the child feel that the new baby belongs as much to him as to his parents, and that his help is needed. Allow him to bring mother the diaper, put a blanket over the baby, with supervision, of course. Finally, it would certainly not be noticed by the wee baby, and would be greatly appreciated by the older child, if some of the gifts were brought to him.

Fright also frequently causes emotional upsets sufficient to start a condition of enuresis. The story is told of a child who was so afraid of soldiers that she would awaken at night and cry out that the soldiers were going to get her. When this child was taken daily to see the soldiers drill, was given reassurance and correct instruction about the soldiers, and was allowed to make the acquaintance of some of them, her fears disappeared and she stopped wetting her bed.

A boy of 8 years of age had developed a chronic state of nocturnal enuresis. His cure was achieved by the following means. No one was allowed to talk about it. He was given to understand that correcting this habit was his own business and that he himself had the ability to conquer the habit.

Colds

A recent survey showed that one-fourth of all United States families reported colds in October, 1941, and that this figure rose to one-third during the next month (November).

Causes

Much research is being done, much research has been done, and yet little is known about colds. It is believed by some that the infection is caused by a virus (a poison or a germ too small to be filtered out). It is thought by some to be prevented and cured by vitamin A. Others credit prevention and cure of colds to vitamin D (ultra-violet light and sunshine). Others seem to get results with alkalies, while still others use a bacterial vaccine beneficially.

Prevention

Colds are most common from the month of October through March. It is significant that some people in the United States tend to shut themselves in for the winter. In a recent survey, farm families seem to have more colds than do families living in cities or towns. The children of farm families go to school in a bus; the man does the daily chores; but frequently the women do not get out for days at a time. As one of them said, "There is no place to go." There is much beauty in the country in winter and plenty of outdoor sports, but more people must be taught to appreciate them. Town and city people, on the other hand, go to their respective jobs in automobiles, taxis, street cars, or suburban trains and are shut up in hot offices or school rooms with far too little fresh air. They come out overheated to face the low temperatures of the winter months. Houses are often overheated with dry heat. Tension is greater because people are living closer together in the winter and are frequently working longer hours. They get fatigued and instead of stopping or slowing down at this point, they wait until sickness knocks them out. Variety in food is likely to be more limited in winter than in summer and is apt to contain an abundance of rich foods such as pie, pancakes, doughnuts, plum puddings, sausages, and candy. And regardless of occupation, people are likely to eat much of these foods—in fact, frequently overeat. After they get a cold, people too frequently continue with their work or school, go to theaters or to bridge clubs, and mingle with other people. This is unfortunate because it is more likely to spread the disease.

A few suggestions for the prevention of colds are:

1. Keep up some daily outdoor exercise throughout the year, such as gardening, a hike, a walk, a game of golf, skiing, skating, or tobogganing; put children out to play daily.
2. Eat a balanced diet, but do not overeat; have plenty of vitamin A foods—eggs and a green or yellow vegetable, citrus fruits (oranges, lemons, or grapefruit) or tomatoes daily, liver once a week, fat fish once a week; keep up daily fruits and vegetables, either canned, fresh, or dried.
3. Keep your home warm but not hot (get a thermometer and avoid temperatures above 70 degrees Fahrenheit).
4. Keep the air moist; if hot air is the type of heat, the furnace usually has a pan, which, if kept filled with water, keeps the air moist; there are long pans for this purpose to be hung on the back of steam or hot-water radiators; keep a tea kettle of water on the kitchen stove whenever possible.
5. Ventilate your house occasionally; a good time to do this is just after the family has had an outing.
6. Sleep with open windows whenever possible; people in exposed places in the country frequently have to close their windows before morning, when outside temperatures hover around zero and there is a strong wind.
7. Keep away from people who have colds and, if you must meet them, do not kiss them or shake hands with them; do not use their drinking cups or dishes until they are thoroughly washed.
8. Wash your hands well before eating or before preparing food for your family.
9. Try not to get over-tired, especially from indoor activities.
10. Do not use medicine except on the advice of your doctor.

Treatment

If you get a cold, stay home, go to bed, get plenty of rest, drink lots of water and fruit juices, eat simple, easily digested foods.

The old idea to "feed a cold and starve a fever" is all wrong. One wonders how it originated. A friend who spent most of her life in China says it is of Chinese origin and reads, "If you feed a cold you will starve a fever." Fortunately, a person with a cold usually does not want food.

Keep the air moist. Many doctors are suggesting that the patient keep a tea kettle of water boiling in his room. Use paper handkerchiefs, paper napkins, or pieces of old linen (old discarded table cloths or napkins, cut in pieces, are excellent) in place of handkerchiefs. They can be put into a paper bag, kept for that purpose, and burned at the end of each day. Cover your sneeze or cough with one of these handkerchiefs to prevent your family and friends from getting your germs. Cover your nose when feeding the baby. Gargling the throat with warm salt water several times a day is another good precaution.

If an infant gets a cold, offer him breast milk or milk formula with twice his usual amount of orange juice and plenty of boiled warm water and 1 teaspoon of cod-liver oil or its substitute (see page 184). Do not urge eating. If vomiting is associated with cold and coughing, the infant on breast milk may be helped by reducing his feedings. The formula for the bottle-fed infant may be skimmed milk thickened with barley flour or Cream of Wheat in place of sugar and given in a smaller quantity. Give water immediately preceding or immediately following this formula. As the fever subsides and appetite improves, the amount of food offered should be gradually worked up to the amount needed for his age and weight.

Children should be given cod-liver oil or its equivalent for vitamins A and D (see page 184) and a liquid or semi-solid diet, with fruit juice and water offered every hour. The rest of the diet—milk, white toast, Cream of Wheat, rice, junket and gelatin desserts—should be offered but not urged. An adult will benefit, too, by having fruit juice every hour or two and by taking only very simple food as he feels the need of and desire for it.

As the patient feels better, he should be able to get out of bed and even out of doors in the sunshine for part of the day if there is not too strong a wind and if the weather is not too cold. It takes too much energy to resist wind and cold temperatures.

As appetite improves, the child or adult will want and need a good building diet. A typical day's diet for one trying to get on his feet after having a cold or the grippe might consist of three meals such as follow.

For *breakfast,* one might take an orange or grapefruit (or juice of one of these) or, as second choice, some other fruit; a piece of buttered toast, preferably made of whole-wheat bread; an egg; and a glass of milk or a cup of hot milk flavored with cocoa, or coffee or tea for the adult.

Dinner, whether at noon or at night, might begin with a fruit juice, clear beef bouillon, or tomato soup or juice to stimulate the appetite. This could be followed by a small serving of meat such as steak or a lamb chop or a slice of broiled liver; a baked potato and some other vegetable, preferably tomatoes, spinach, asparagus, carrots, or cabbage that is cooked only until tender and still retains its natural color and a delicate flavor; perhaps a lettuce salad with lemon juice or French dressing made with lemon juice. The dessert should be a simple one of eggs and milk, like a custard, or fruit as such or as fruit gelatin, fruit cup, or fruit soufflé.

The *third meal,* either lunch or supper, may consist of a cream soup, like cream of tomato soup, or oyster stew; a vegetable salad; stale bread or toast and butter; and a dessert of the kind suggested for dinner. However, if an egg or milk dessert is served for one of these meals, a fruit dessert should be served at the other to give variety.

In addition to these three meals, fruit juice is good between meals as often as the patient wishes it.

If an adult is subject to colds often, it may be well for him to try building up his vitamin A reserves (see page 51) or to take cod-liver oil or its equivalent (see page 184).

Allergy

Allergy is an abnormal reaction or specific hypersensitivity in an individual, due to some substance which produces no reaction in most human beings.

Symptoms

When a person displays hypersensitivity to any substance, certain symptoms are likely to appear. They may be largely located in the skin, in the gastro-intestinal tract, in the respiratory region, in the head, or in the nasal cavity. According to Kugelmass, eczema is likely to be the most common symptom during the first 6 months of life, and asthma (characterized by difficult breathing with a wheezing cough and a feeling of constriction) usually begins after the third year, especially in those who had eczema earlier. Urticaria (nettle rash or hives) is about as common as asthma and begins after 6 months of age. All other forms of allergy usually start later in childhood. One out of every 4 cases of allergy, however, begins during the first year of life.

In general the symptoms may be shown not only as eczema, urticaria, or asthma but also as other associated symptoms. These may be swelling of the lips, burning sensation in the esophagus and stomach, nausea, sour stomach, vomiting, canker sores, colic, coated tongue, foul breath, abdominal distension, belching, pain and soreness in the abdomen, gas in the bowels, constipation, diarrhea, toxicity, weakness, nervousness, general dullness and depression, difficult breathing, dry cough, wheezing, nasal catarrh, cold in the head, hay fever, or sick headache. It should be corrected in the early stages if possible, without too much concern shown about it or else it is likely to become chronic with severe reactions, incapacity, or localized distress and invalidism.

The subject of allergy, as will be noted, is too broad to be discussed in a book of this nature. However, since 1 out of every 4 cases starts in infancy with eczema and since we have been able to cure eczema in several hundred babies, we will confine our discussion to the type of allergy characterized by eczema, and to our method of treatment.

Eczema

The word eczema comes from a Greek word meaning to boil. It is a word applied to certain skin diseases characterized generally by itching, redness, and the collection of fluid under the skin. In the milder forms there may be simply red, dry-looking skin. Other forms may develop cracks, especially over the joints. Again there may be a definite enlargement of the skin papillae (shown as small nipple-shaped elevations). There may be, and frequently is, itching. There may be a rash or moist raw surface, following the redness and resulting in crusting and scaling. Eczema may start on the face, buttocks, hands, or other parts of the body. It can spoil the looks as well as the comfort of a perfectly beautiful baby. One mother reported that she thought babies were always pretty until she saw those with eczema in the doctor's office. These poor infants were so badly broken out that they looked "terrible." Eczema, if not cleared in infancy, may continue into childhood, frequently becoming localized in creases of neck, ear, wrists, elbows, on arms and legs, behind knees, and around the genitals.

Causes

The causes of allergic eczema are varied, but many allergies are due to food, and any food taken in excess may be suspected of causing eczema. It is much more prevalent in infants and children who gain too fast than in underfed children. Though there may be other causes of eczema, we will confine ourselves in this book to those eczemas caused by food.

Prevention

If a baby's grandmother, his aunt, his mother, or his dad has eczema does not mean that he must have it. If his food is well balanced, we see no reason why eczema should develop. Even the egg yolk, which has such a black name as causing eczema, has been given in our formula to more than a thousand babies without producing eczema. In fact, we always give egg yolk to our babies almost as soon in infancy as we see them. Egg yolk is a good food and should not be condemned. What then is the answer? First, prevention by a balanced diet. (We say this as the result of the feeding of 42 babies in the practice house and as a result of directing the feeding of more than a thousand others.)

Here are a few suggestions for prevention:

1. Always give baby a balanced diet, with not too much or too little of any food or nutrient such as protein, calcium, or fat.
2. Begin each new food in very small quantities, increasing a little at a time, and, if even the slightest redness appears on face, hands, or buttocks,

check the amount of various foods one by one to see which might be causing the difficulty. You cannot cure diaper rash, caused by food, by washing diapers 4 to 6 times. It can be cured only by changing the food. It is not unusual for a mother to bring in a baby with buttocks broken out, and to say that she had been washing the diapers 6 or 7 times with no result. But as soon as the formula was changed, the buttocks cleared up. If the urine smells strongly of ammonia, baby is getting too much milk. Unless the amount of milk is reduced, eczema may result.

3. Never force any food. Babies often have better sense than we give them credit for. On the other hand, if the diet is unbalanced, a baby may overeat. We believe this is because baby is trying to get enough to meet his needs of some food principle, such as iron or thiamin, that is lacking in his diet. A baby on a balanced diet should not overeat.

4. Check commercially prepared baby foods. They may be easy to use, but they frequently have an added ingredient already contained in sufficient amount in the child's diet. Furthermore, we believe from our research here that babies develop eczema not only from too much of any food, such as too much orange juice, too much milk, too much egg, but also from too much of any food principle as well. We mean by that, from too much protein, too much calcium, too much fat, too much sugar, and perhaps from too much of any mineral or vitamin. In fact, from an unbalanced diet.

Treatment

Our treatment consists in finding out wherein the diet lacks balance, and balancing it.

The following examples will give some idea of how this is accomplished.

Case 1. Jimmie, a practice house baby, came to us at 2 months of age, weighing 10 pounds 2 ounces. His buttocks was red and blistered, and his face was covered with little bumps, which looked as if they might be almost ready to break through; there were also some of the same kind of bumps on his chest. The doctor said it was eczema. The baby was a nicely developed baby otherwise. The urine smelled strongly of ammonia.

The baby, weighing 10 pounds 2 ounces when he arrived, had been getting for the last three days:

24 ounces of cow's milk
4 tablespoons of brown sugar
6 ounces of water

in 5 feedings of 6 ounces per feeding. He was also getting

2 tablespoons of orange juice
2 teaspoons of cod-liver oil.

He had three movements in the night after his arrival at the Practice House. Two movements were pasty whitish, and one was quite curded.

The next day, October 2, the baby was put on a formula to meet his needs except for iron. He had been having both too much milk, almost 2½ ounces instead of 1½ ounces per pound of his weight each day, and too much cod-liver oil, 2 teaspoons a day. So he had been having too much of a number of things, among them too much protein and too much fat. It was not considered wise, therefore, to add immediately egg yolk (a high-protein, high-fat food) or liver (a high-protein food) even though Jimmie needed one of these foods for iron. But by October 8 (6 days later), Jimmie was taking with ease:

15½	ounces of milk
16	ounces of water
4	tablespoons of Dextri-maltose No. 2 (used because of loose bowels when he came)

He had started egg yolk in his formula and was getting 1 teaspoon of orange juice and daily sunbaths. His buttocks had completely cleared up (the doctor pronounced it perfect), his face was practically cleared, and he had but 2 or 3 tiny spots left on his chest.

By October 14 (less than 2 weeks after his arrival), he was taking the whole egg yolk with one good normal movement a day, no breaking out, and no other difficulty, and he was gaining 8 ounces a week.

And when he was ready to leave the Practice House, at 10 months of age, Jimmie was having all the foods of a normal ten-month-old baby—milk, egg yolk, cod-liver oil, orange juice, strained cereal, a crust of bread, strained liver and vegetables, and was beginning strained fruit sauce. He was well, happy, and normal (see photo, page 207).

Case 2. Mary, 4 months old, had been bottle fed since birth. She had been given at first the equivalent of 1½ ounces of cow's milk per pound of her weight, evaporated milk being used. At 3 months she had worked up to 2 ounces per pound, which she took part of the time. Her mother did not urge her to empty the bottle, part of which she usually refused once or twice a day. At 3½ months cereal was introduced in the form of commercial, ready-prepared cereal of wheat, corn, and oats, reinforced with bone meal and alfalfa. The baby immediately broke out. The mother reported she had considerable rash on her face. She took her back to her doctor who said she had eczema, which he thought was caused by the wheat. He directed her to take the baby off the prepared cereal and give rolled oats as the only cereal. On this treatment the eczema cleared up. But one day, according to the mother, she had no oats; so she cooked a whole rolled-wheat cereal and nothing happened. She gave it for a week and baby was fine. Then one day she decided to try the ready-prepared cereal again. Baby broke out as before. It was then that the mother brought the baby to the College to ask, "Why?" As we studied this case, we noted that Mary, having 2 ounces of milk per pound of baby per day, was more than meeting her requirements for protein, calcium, and phosphorus and was trying to tell the world so by refusing her formula part of the time. Yet, when cereal was added, which should have been given for energy (carbohydrate), iron, and thiamin, they added a cereal made up of wheat and oats and reinforced with bone meal (calcium and phosphorus) and alfalfa. Mary broke out. Yet Mary could take either oats or wheat with no bad effects. She was already getting more than enough calcium and phosphorus to meet her requirement in her milk. The answer, therefore, we believe is that this baby had too much calcium and phosphorus. When Mary was put on a balanced diet with plain, strained whole cereal (whether oats or wheat) and was not forced to empty her bottle, she was fine but a little pale. On this artificial formula, Mary needed more iron. Mothers should read the label on the can and know what they are feeding their babies.

Case 3. Jack, aged 2 months, was definitely underfed but had eczema. He had a milk formula sufficient to meet his needs for protein, calcium, and phosphorus. When egg yolk, cod-liver oil, and orange juice were added to his diet, his eczema disappeared entirely in 5 weeks.

Case 4. Daniel was overfed on a formula of lactic acid, evaporated milk and sugar, orange juice and cod-liver oil. He had doubled his birth weight at 3 months of age, but his face and arms were literally covered with eczema. When his milk and cod-liver oil were reduced, egg yolk added, and his diet balanced generally, his eczema cleared in 3 months.

Case 5. David was breast fed. When he came to the College at 4 months of age, his face was covered with eczema. He had gained fast on nothing but mother's milk, orange juice, and cod-liver oil. His eczema had started at 2 weeks of age. It was cured by giving both breasts but decreasing the nursing time at each breast, so that the baby did not get the strippings—the last part of mother's milk which is the richest—and by giving the baby boiled warm water before each feeding.

Case 6. Susan's terrible condition of eczema, apparently also due to too much fat, was cured when her formula was made of Holstein instead of Guernsey milk.

Case 7. Jane, 2 months old, had been given 2 ounces of orange juice daily for the two weeks preceding the outbreak of eczema upon her face and hands. The mother, not knowing that too much orange juice can cause eczema, had continued the daily 2 ounces until Jane's face and hands were quite red and broken out. When tomato juice was substituted for orange juice, Jane's eczema cleared.

Case 8. One of the worst cases was Anne—a big anemic, rachitic ten-month-old baby, with face, arms, and buttocks covered with eczema. She was getting much milk, 2½ ounces per pound per day, much cod-liver oil, 3 teaspoons a day, orange juice, strained vegetables, cereal, and fruits. When milk and cod-liver oil were reduced, egg yolk and liver added, and Anne exposed to the sunshine daily, her eczema, rickets, and anemia began to improve almost immediately and were gradually corrected.

Case 9. Ray, 8 months old, broke out with eczema when egg yolk was added to his diet. Ray was breast fed and was gaining very fast. He no doubt was having either too much or quite rich mother's milk. Since mother's milk is high in iron, the egg yolk was removed temporarily and replaced in Ray's diet with no further trouble when he was weaned.

Case 10. Carl, a four-month-old breast-fed baby, was brought to us suffering with constipation and some eczema on his face and back. He was starting to spit up his food. The mother reported, "He plays with the breast and prefers only the first part of it. I try to make him empty one breast each feeding to keep up my milk, but he just refuses to empty it." Carl's eczema and constipation cleared up under the following treatment: He was given but 5 minutes on one breast and allowed to take as much as he wished from the second; he was given water, fruit juice, and fruit pulp. A child will frequently decide what is best for him. Carl was doing this.

Often reports of mothers of pre-school or school children with eczema show that the child likes the foods which are needed in his diet and would refuse those causing difficulty—just as this breast-fed baby was doing. This, however, is not always the case.

With the older child the same principle of balancing the diet is usually all that is necessary to cure the eczema. It is necessary to find out what the child actually eats each day, what foods he likes, what foods he dislikes, when and on what food the eczema started, his whole past history of feeding, and what the mother thinks is responsible for the eczema. Put the child on a diet quite low in the disturbing food, that is, the food which has been taken in excess or to the elimination of other foods, but with a well-balanced diet otherwise. Then very gradually increase the offending food, watching reactions.

Bruning found that the occurrence of eczema, furinculosis (condition causing boils), and the seasonal occurrence of asthma, diphtheria, scarlet fever, and other diseases may be correlated with lack of sunshine. We, too, have found sunbaths a decided help in curing eczema.

Urbach says that clinical experience shows that for people with skin disease there is a good season and bad season of the year. The difference depends upon the skin disease. But, on the whole, summer was found to be the best and spring the worst. This may be due partly to the limitations in food in winter and late spring or to more outdoor life and sunshine in the summer.

It is our custom to give all our children as much outdoor life and sunshine as possible throughout the year, and we believe this is as important as proper food.

Contagious Diseases of Childhood

Cause

There are quite a few contagious or communicable diseases of childhood which might be reduced in number and severity if parents knew more about them.

These diseases usually are caused by germs that may be taken in by mouth, nose, or eyes. They are not everywhere as is often supposed, but are in the bodies of those who have the disease, those who have had it, those who are coming down with the disease, or in the body of some "host" or carrier.

It is when these germs freshly escape from the bodies of such people that another person may take the disease. It is carried out to other people from the body of the sick person by his sneezing, coughing, breathing, speaking, kissing, or by the hands, towels, drinking cup, or sometimes by food handled by him.

The germs need warm, moist, dark places, and food, like the tissues and secretions of the human body, in order to grow. Otherwise they soon become harmless or die.

Prevention

The prevention of all these diseases depends first upon their recognition by parents, teachers, and others working with children. In order to help with this recognition, see Appendix, page 374.

If any of the signs or symptoms in the second column of this table are shown by your child:

1. Call your doctor.
2. Keep the child home from school, church, Sunday school, and the theater. In fact, do not let the child come in contact with any other children. When a child is sent home from school, it means he is to be kept

home, away from other children, and not allowed to go to church, Sunday school, theater, or run the streets.

3. If you know of a child sent home from school because of any illness, do not let your child play with him.

4. See that your child has his own drinking cup and his own towel.

5. Teach your child to put only food and drink into his mouth and to wash his hands before eating. Many children pick up anything and put it into their mouths, thus constantly running risks of contagion.

6. When a child knows these fundamentals, let him live happily with other children, with plenty of outdoor life.

Feeding in General

Feeding during sickness in all cases should comprise simple, easily digested, nutritious food—at first a liquid or semi-solid diet such as milk, fruit juices, eggnogs, soft or boiled custard, followed by gelatin desserts, rice and milk, white toast, soft-boiled or poached egg. The feeding of a child with whooping cough, however, presents additional difficulties in feeding as it is usually a long-drawn-out disease associated with vomiting. Whooping cough is therefore likely to leave its young patient severely debilitated.

Diet in Whooping Cough

Undernourishment is one of the dangers of whooping cough; so it is very important that the food be nutritious and easily digested and food that will be retained. Vitamin C has been found to be especially helpful during whooping cough. It is best to give the food in small quantities and frequently, especially when vomiting is troublesome. It is a good plan to employ a semi-solid diet, free from roughage. It is advisable that such food be given immediately after the attacks of vomiting. A cup of milk or meat broth, either of which may contain rice, noodles, or white bread, is suggested. The following points have proved helpful:

1. Try to give sufficient calories to keep up the body weight.
2. Keep the bowels open.
3. If frequent vomiting, give liquids or semi-solids during the day. Semi-solid food will usually stay down better than liquid or solid food. Also, try giving the breakfast in bed.
4. Avoid dry toast, crackers, bread, or any food that may be irritating and cause coughing. Soak toast or crackers or bread in milk, soup, or broth.
5. All food should be free from roughage or strained. Sometimes the inner sections of orange or grapefruit without the tough, papery cellulose

can be given. Cooked fruits should be strained. Vegetables should be cooked and strained and served as purée or soup.

6. Where grapefruit, lemons, oranges, or tomatoes are not part of the meal, it may be well to begin the meal with the juice of ½ orange or with lemon with a little sugar and water to stimulate appetite.

7. The cereal for breakfast may be well-cooked Rolled Oats, Wheatena, Cream of Wheat, or hominy grits or well-soaked Puffed Rice or Corn Flakes. If whole cereals cause irritation, they may be strained.

8. If it is hard to take the amount of milk required, dried or powdered milk may be added to cereals and creamed dishes, or ½ teaspoon of grated cheese may be used on the food.

The following day's diet has been found helpful in feeding children with a cough and vomiting, as during whooping cough.*

Breakfast

¼ sliced sections grapefruit or juice
4 tablespoons cooked cereal with
¼ cup top milk
1 slice bread and butter
¾ cup milk

Midmorning Lunch

1 teaspoon cod-liver oil
⅓ cup orange juice

Dinner

2 tablespoons mashed potatoes
⅓ cup creamed chicken
¼ cup buttered peas, strained
1 (1 slice bread) lettuce sandwich (may have to be omitted if irritating)
¼ cup vanilla ice cream

Midafternoon Lunch

¾ cup milk
1 soda cracker softened in milk

Supper

1 serving milk toast
1 baked apple without skin
⅔ cup milk

The amounts given are for an average four-year-old. A three-year-old will take a little less. A two-year-old will take about three-fourths of these amounts. School children may take half again or even twice as much.

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* Menus which have been successfully used during whooping cough may be obtained by writing to the College of Home Economics, Cornell University, Ithaca, New York.

A Few Do's and Don'ts

Sanity in regard to one's health and the health of one's family goes a long, long way.

Make sure by means of a thorough physical examination that there is nothing organically wrong with your children and then let them live—play, romp, eat, and sleep like little animals.

Teach children, especially by example, the ordinary laws of sanitation and sanity, but do not worry the life out of them trying to find something wrong with them.

Aim for a well and happy child.

Don't get so worried about your health and your family's that you let any food faddist sell you any idea. Don't let anybody sell you one food as a cure-all for everything—no one food is. A balanced diet will do more for you.

Don't think you need to give your family vitamin and mineral capsules and other reinforced foods to keep them healthy. If they are fed a balanced diet, they get all the vitamins and minerals they need, especially if they get out of doors (in sunshine when possible) one hour or more each day and have fat sea fish once a week and liver once a week, at least in the winter.

Don't get disturbed because some one publishes an article saying milk causes cancer. Just stop to think how absurd such a statement is! If this statement were true, most of us would be dead of cancer already. On the other hand, we know what lack of milk in the diet will do. Don't go to extremes either way. Milk alone will not nourish children or adults. And you can take too much. But 1 pint to 1 quart a day is necessary to health and good body building.

Don't take your children too seriously—in the form of aimless worry. Don't worry over facts which you cannot alter. It is true that vegetables and fruits are sprayed while growing to prevent disease. It is true that this spray is often poisonous. However, there is a law making it necessary that vegetables and fruits be washed to the point of safety before selling. Wash again before eating them and stop worrying. At least, don't get too upset or let your family get too upset over things you can't help.

Don't think that food alone, even the best, will keep you healthy. It won't. Frequently we hear of comparisons of human beings on a good diet with American Indians, cowboys, and others leading outdoor lives with less good food. Recently Dr. Arthur Holmes, Frank G. Ashbrook, and others reported that wild foxes have 100 times more vitamin A stored in their livers than do ranch-raised foxes fed the best-known diets. As these research workers say, "Despite all the publications about diet, scientists are still only at the beginning of knowing the facts about nutrition."

We have been asked for pictures of beautifully developed children and have realized that diet is not all. Our most beautiful specimens are usually those with much outdoor life and a sane home environment.

In conclusion—follow the advice of the Chinese sage quoted on page 313. Keep yourself and your family on a well-balanced diet and a well-balanced program of fresh air, outdoor exercise, and sunshine. Learn to enjoy some outdoor sport as gardening, hiking, or tennis.

Learn to sing, whistle, or hum, and play. It is good for your soul, for your family, and for your friends.

REFERENCES

1. J. H. Hess, *Feeding and the Nutritional Disorders in Infancy and Childhood,* F. A. Davis, Philadelphia (1928).
2. J. P. C. Griffith, *The Diseases of Infants and Children,* Sanders, Philadelphia (1921).
3. I. N. Kugelmass, *Newer Nutrition in Pediatric Practice,* Lippincott, New York (1940).
4. M. S. Rose, *Feeding the Family,* 4th Ed., Macmillan, New York (1940).
5. L. J. Bogert and M. T. Porter, *Dietetics Simplified,* Macmillan, New York (1940).
6. J. L. Morse and F. B. Talbot, *Diseases of Nutrition and Infant Feeding,* Macmillan, New York (1920).
7. A. N. Donaldson, Relation of constipation to intestinal intoxication, *Jr. Am. Med. Assoc.,* Vol. 78, page 884 (1922).
8. W. C. Alvarez, Intestinal auto-intoxication, *Physiol. Rev.,* Vol. 4, page 352 (1924).
9. H. D. Chapin and L. T. Royster, *Pediatrics,* William Wood (1933).
10. W. C. Alvarez and B. L. Freedlander, The rate of progress of food residues through the bowel, *Jr. Am. Med. Assoc.,* Vol. 83, page 576 (1924).
11. *Enuresis,* U. S. Dept. Labor, Children's Bureau, Publication 143.
12. H. Bruning, Effects of sunless seasons on skin and mucous membranes and their treatment in children, *Deut. med. Wochschr.* Rastok., pages 1932–58, (1915–18).
13. E. Urbach, *Seasonal Fluctuations in Skin Diseases,* William Mandrick Co., Vienna.
14. *The School Child's Health, What Mothers Should and Can Do About It.* Prepared by the Am. School Hygiene Assoc. with the cooperation of the American Red Cross.
15. E. P. Neuschwanger, Eczema in Infants and Young Children, thesis for degree of M.S., Cornell University, 1938.
16. E. L. Gardner, What is chronic constipation? Some common fallacies in its diagnosis and management, *Minnesota Medicine,* pages 678–698, December, 1926.

APPENDIX

Thermometers

Though the Fahrenheit thermometer is the one most generally used in this country, there may be times when we would like to be able to convert the figures given in one scale to another. The principle back of this is:

1. The freezing point of water on the centigrade thermometer is 0°; on the Fahrenheit it is 32°.
2. The boiling point of water on the centigrade thermometer is 100°; on the Fahrenheit it is 212°.

The change from freezing to boiling is 100° centigrade (100–0), or 180° Fahrenheit (212–32). Therefore a change of 1° centigrade is equal to a change of $\frac{9}{5}$° Fahrenheit ($\frac{180}{100} = \frac{9}{5}$); or a change of 1° Fahrenheit is equal to a change of $\frac{5}{9}$° centigrade ($\frac{100}{180} = \frac{5}{9}$). By use of this fraction of change, one scale can be converted to the other based on difference from the freezing point or the boiling point on the two scales.

Examples

1. 10° centigrade = 10° centigrade above freezing = 32° Fahrenheit $+ \frac{9}{5} \times 10 = 32 + 18 = 50$° Fahrenheit.
2. 68° Fahrenheit $= 68 - 32$, or 36° Fahrenheit above freezing = 0° centigrade $+ \frac{5}{9} \times 36 = 20$° centigrade.

Measurements

Abbreviations Commonly Used

mcg = microgram
mg = milligram
cg = centigram
dg = decigram
cc or ccm = cubic centimeter
ccm = cubic millimeter
oz = ounce
lb = pound
kilo or kg = kilogram
in. = inch
ft = feet

cu in = cubic inch
t or tsp = teaspoon
T or tbsp = tablespoon
c = cup
pt = pint
qt = quart
gal = gallon
doz = dozen
no. or # = number
I.U. = International Unit
A.P. = as purchased
E.P. = edible portion

Measures with Approximate Equivalents

20 drops = 1 cc = 1 gram = 0.0353 oz
100 drops = 5 cc = 5 grams = 1/6 oz = 1 tsp (level)
1 heaping tsp = 2 level tsp
1 heaping tbsp = 2 level tbsp
3 level tsp = 1 level tbsp = 15 cc
6 level tsp = 2 level tbsp = 30 cc = 1 oz
16 level tbsp = 1 level c = 240 cc = 8 oz
2 level cups = 1 pt = 480 cc = 16 oz
2 pt = 1 qt = 960 cc = 32 oz
4 qt = 1 gal
1 liter = 2.1 pt = 1.0567 qt

Weights with Approximate Equivalents

1 gram = 0.035 oz.
1 oz = 28.35 grams
16 oz = 1 lb
1 lb = 453.6 grams
2 lb = 907 grams
2.2 lb = 1,000 grams = 1 kilo *or* 1 kg
35.2 oz = 1,000 grams = 1 kilo *or* 1 kg
1 mcg = 1,000 mg
10 mg = 1 cg
10 cg = 1 dg
10 dg = 1 gram
1,000 grams = 1 kilo

Linear Measures

1 cm = 0.3937 in.
1 in. = 2.54 cm
1 meter = 39.37 in.
12 in. = 1 ft
3 ft = 1 yd

Measure Equivalent for Weight of Food

FOOD	WEIGHT	APPROXIMATE MEASURE
Apples	48 lb	1 bushel
Apples, A.P.	1 lb	2½–3 medium
Apricots, dried	1 lb	3 cups
Bacon, sliced	1 lb	16 slices
Bananas, A.P.	1 lb	3 medium
Beans, kidney, dried, A.P.	1 lb	2¼ cups
lima, dried, A.P.	1 lb	2⅓ cups
navy, dried, A.P.	1 lb	2½ cups
fresh, green, cut	1 lb	4 cups
Beef, ground raw	1 lb	2 cups
Cabbage, shredded	1 lb	2⅔ cups
Chocolate, grated	1 oz	4 tbsp
Coffee, coarse grind	1 lb	5½ cups
fine grind	1 lb	5 cups
Cornmeal, uncooked	1 lb	3 cups
	1 oz	3 tbsp
after cooking	1 lb	3½ qt
Cream, heavy whipped		doubles in bulk
Dates, unpitted	1 lb	2½ cups
pitted	1 lb	3 cups
Eggs, whole, without shell	1 lb	10 medium (2 cups)
Egg whites	8 oz	8–10 (1 cup)
Egg yolks	8 oz	12–16 (1 cup)
Figs, dried, A.P.	1 lb	25–30 figs
dried, cut up	1 lb	2¾ cups
Flour, bread sifted	1 lb	4 cups
graham, sifted	1 lb	3½–3¼ cups
pastry, sifted	1 lb	4 cups
rye, sifted	1 lb	5⅓ cups
Gelatin, granulated	1 oz	4 tbsp
Honey	11 oz	1 cup
Lard	1 lb	2 cups
Lemons	1 lb	3–5 medium
Molasses	12 oz	1 cup
Nuts (almonds, English walnuts, pecans)	1 lb	4 cups
Oats, rolled	1 lb	4¾ cups
Onions, A.P.	1 lb	4–5 medium
chopped	1 lb	2½–3 cups
Peaches, fresh	48 lb	1 bushel
	1 lb	3–5 medium
Peanuts, Jumbo	1 lb	3 cups
Pears, fresh	45–48 lb	1 bushel
	1 lb	3–4 medium
Peas, green	1 lb in shell	1 cup after shelling
Potatoes, Irish	60 lb	1 bushel
	1 lb	3–4 medium
Potato chips	1 lb	5 qt
Raisins, seeded	1 lb	2 cups
seedless	1 lb	3 cups
Rice, A.P.	1 lb	2 cups
after cooking		1⅞ qt
Spaghetti, A.P.	1 lb	5 cups
after cooking		2½ qt
Sugar, brown	1 lb	3 cups
confectioners'	1 lb	3½ cups
cube	1 lb	96 cubes
granulated	1 lb	2 cups
powdered	1 lb	2½–2¾ cups
Tea	1 lb	6½ cups
Tomatoes, A.P.	1 lb	4 medium

C. C. Hart, *Recipes at Moderate Cost*, 1938. Courtesy of F. S. Crofts Publishing Co.

Commercially Canned Goods

Size of Can	*Weight*	*Cups per Can*
No. ½	8 oz	1
No. 1	16 oz	2
No. 2	20 oz	2½
No. 2½	28 oz	3½
No. 3	33 oz	4
No. 5	3 lb 8 oz	7
No. 10	6 lb 10 oz	13

C. C. Hart, *Recipes at Moderate Cost*, 1938. Courtesy of F. S. Crofts Publishing Co.

Classification of Fruits and Vegetables

According to Carbohydrate Content

According to carbohydrate content, 5 per cent vegetables and fruits are those containing the smallest amount of carbohydrate (starch or sugar). They are, therefore, the best ones to use freely in a reducing diet.

One hundred grams, about 3½ ounces of any 10 per cent vegetable or fruit, would have as much carbohydrate as 10 grams, about ⅓ ounce of any dry cereal or macaroni, spaghetti or noodles. (This would be approximately 2 tablespoonfuls of dry cereal.) Three and one-half ounces of cabbage would be about one-sixteenth of a large head or about 6 large leaves of Boston head of lettuce.

According to Carbohydrate Content

100 grams of the 5 per cent vegetable =
50 grams of the 10 per cent vegetable =
35 grams of the 15 per cent vegetable =
25 grams of the 20 per cent vegetable

5 Per Cent		10 Per Cent	15 Per Cent	20 Per Cent
VEGETABLES				
Asparagus	Kale	Beets	Artichokes (globe)	Beans, cooked
Bean sprouts	Kohlrabi	Carrots	Beans, lima	Kidney
Broccoli	Lettuce	Dandelion greens	Leek	Navy
Brussels sprouts	Okra	Olives, green	Oyster plant	Corn
Cabbage	Olives, ripe	Onions	Peas	Horseradish
Cauliflower	Peppers	Parsnips		Potatoes
Celery	Pumpkin	Rutabagas		
Chard	Radish	Winter squash		
Chinese cabbage	Spinach			
Cucumber	String beans			
Eggplant	Summer squash			
Endive	Tomato			
Greens, beet	Turnip			
Greens, mustard	Watercress			
FRUITS				
Avocado	Rhubarb	Blackberries	Apples	Bananas
Honeydew melon	Strawberries	Cranberries	Apricots	Cherries, sweet
Lemon juice	Watermelon	Currants	Blueberries	Figs, fresh
Muskmelon		Gooseberries	Cherries, sour	Grape juice
		Grapefruit	Grapes	Prunes, fresh
		Oranges	Huckleberries	
		Orange juice	Loganberries	
		Peaches	Mulberries	
		Tangerines	Pears	
			Pineapple	
			Plums	
			Raspberries	

Source of data: Chaney and Ahlborn, *Nutrition*, Houghton Mifflin Co.; Kugelmass, *Newer Nutrition in Pediatric Practice*, Lippincott.

Alkalinity and Acidity of Foods

ALKALINE-ASH FOODS

Food	Measure	Weight		Degree
		grams	*ounces*	
Figs, dried	6 figs	36	1.2	35.6
Dandelion greens	½ cup cooked	100	3.5	27.0
Spinach	½ cup cooked	100	3.5	27.0
Chard leaves	½ cup cooked	140	5.3	23.5
Raisins	½ cup	67	2.4	15.8
Apricots, dried	½ cup cooked	140	5.3	12.5
Parsnips	½ cup diced	100	3.5	11.9
Beets	½ cup diced	100	3.5	10.9
Molasses	1 tbsp	17.5	0.6	10.4
Carrots	½ cup cooked	80	2.8	8.7
Rhubarb	½ cup cooked (scant)	100	3.5	8.6
Tomato	½ cup canned or 1, 2½″ diam.	133	4.3	7.6
Lettuce	¼, 4″ head	100	3.5	7.4
Potato	1 baked 2½″ diam.	100	3.5	7.0
Pineapple, fresh	½ cup diced	100	3.5	6.8
Potato, sweet	½ medium	100	3.5	6.7
Beans, navy	½ cup canned	100	3.5	6.4
Bananas	1, 6½″ or ¾ cup, sliced	100	3.5	5.6
Oranges	pulp of 1, 2½″ diam.	100	3.5	5.6
Lemons, E.P.		100	3.5	5.5
Peaches, fresh	1 medium	100	3.5	5.0
Cabbage, white, fresh	½ cup cooked, 1⅛ cup raw	75	2.7	4.5
Beans, string	½ cup raw	75	2.7	4.3
Cauliflower	½ cup cooked	75	2.7	4.0
Celery	2 medium stalks	50	1.8	3.9
Apples	1, 2″ diam.	100	3.5	3.7
Milk	¾ cup or 1 glass	200	6.0	3.6
Pears, fresh	1 medium	100	3.5	3.6
Squash, winter	½ cup mashed	100	3.5	2.8
Turnips	½ cup cooked	100	3.5	2.7
Watermelon	2½″ × 2½″ × 1″	100	3.5	2.7
Buttermilk	½ cup	100	3.5	2.2

ACID-ASH FOODS

Food	Measure	Weight		Degree
		grams	*ounces*	
Turkey, dark	4 slices, 1¾″ × 1½″ × ⅛″	100	3.5	19.3
Turkey, light	2 slices, 3½″ × 3″ × ¼″	100	3.5	17.1
Oysters	4 large	100	3.5	15.2
White fish	2″ × 3″ × 1″	100	3.5	11.3
Chicken, broiler	½, medium size	100	3.5	10.8
Salmon, canned	½ cup flaked	100	3.5	10.8
Beef, round, lean	1 slice, 4″ × 4″ × ½″	100	3.5	10.6
Liver, beef, uncooked	3″ × 6″ × ½″	100	3.5	10.1
Ham, boiled	2 slices, 4½″ × 4½″ × ⅛″	100	3.5	10.0
Pork chops, lean	1 medium chop, ½″ thick	100	3.5	10.0
Veal chop, med. fat	3″ × 2¾″ × ⅛″	100	3.5	9.8
Halibut	4″ × 1¾″ × ¾″	100	3.5	9.4
Lamb chops, E.P.	3 medium chops	100	3.5	9.3
Cheese, Cheddar	⅞ cup grated or 3″ × 2″ × 1″	100	3.5	5.5
Eggs, whole	1 medium	50	1.8	5.5
Rice, polished	¼ cup uncooked	50	1.8	4.7
Flour, whole-wheat	¼ cup	33	1.2	4.1
Egg yolk	1 yolk	16	0.6	4.0
Flour, white	¼ cup	31	1.1	2.7

In general, the acid-producing foods are meat, fish, oysters, cereals, cheese, and egg.

In general, the alkaline-producing foods are vegetables, especially green vegetables, and milk, fruits, especially dried fruits (except prunes, plums and cranberries, which are acid-producing owing to their benzoic acid content).

Source of data: Chaney and Ahlborn, *Nutrition*, Houghton Mifflin Co.

Recommended Daily Allowances for Specific Nutrients *

Committee on Foods and Nutrition, National Research Council

	Calories	Protein	Calcium	Iron	Vitamins					
					A †	Thiamin (B_1) ‡	Ascorbic acid (C) ‡	Riboflavin	Niacin (nicotinic acid)	D
		grams	*grams*	*milligrams*	*I.U.*	*micrograms*	*milligrams*	*micrograms*	*milligrams*	*I.U.*
Man (70 kg or 154 lb)										
Moderately active	3,000	70	0.8	12	5,000	1,800	75	2,700	18	§
Very active	4,500	70	0.8	12	5,000	2,300	75	3,300	23	
Sedentary	2,500	70	0.8	12	5,000	1,500	75	2,200	15	
Woman (56 kg or 123 lb)										
Moderately active	2,500	60	0.8	12	5,000	1,500	70	2,200	15	§
Very active	3,000	60	0.8	12	5,000	1,800	70	2,700	18	
Sedentary	2,100	60	0.8	12	5,000	1,200	70	1,800	12	
Pregnancy (latter half)	2,500	85	1.5	15	6,000	1,800	100	2,500	18	400–800
Lactation	3,000	100	2.0	15	8,000	2,300	150	3,000	23	400–800
Children up to 12 years										
Under 1 year ‖	100 per kg	3–4 per kg	1.0	6	1,500	400	30	600	4	400–800
1 to 3 years ¶	1,200	40	1.0	7	2,000	600	35	900	6	§
4 to 6 years	1,600	50	1.0	8	2,500	800	50	1,200	8	
7 to 9 years	2,000	60	1.0	10	3,500	1,000	60	1,500	10	
10 to 12 years	2,500	70	1.0	12	4,500	1,200	75	1,800	12	
Children over 12 years										
Girls—13 to 15 years	2,800	80	1.3	15	5,000	1,400	80	2,000	14	§
16 to 20 years	2,400	75	1.0	15	5,000	1,200	80	1,800	12	
Boys—13 to 15 years	3,200	85	1.4	15	5,000	1,900	90	2,400	16	§
16 to 20 years	3,800	100	1.4	15	6,000	2,300	100	3,000	20	

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* These are tentative allowances toward which to aim in planning practical dietaries. These allowances can be met by a good diet of natural foods; this will also provide other minerals and vitamins, the requirements for which are less well known.

† Requirements may be less than these amounts if provided as vitamin A, greater if chiefly as the pro-vitamin carotene.

‡ One milligram thiamin equals 333 International Units; 1 mg ascorbic acid equals 20 International Units; 1 International Unit equals 1 U. S. Pharmaceutical Unit.

§ Vitamin D is undoubtedly necessary for older children and adults. When not available from sunshine, it should be provided probably up to the minimal amounts recommended for infants.

‖ Needs of infants increase from month to month. The amounts given are for approximately 6 to 8 months. The amounts of protein and calcium needed are less if from breast milk.

¶ Allowances are based on the middle age for each group (as 2, 5, 8, etc.), and for moderate activity.

The requirement for *iodine* is small; probably about 0.002 to 0.004 mg a day for each kilogram of body weight. This amounts to about 0.15 to 0.30 milligram daily for the adult. This need is easily met by the regular use of iodized salt; its use is especially important in adolescence and pregnancy.

The requirement for *copper* for adults is in the neighborhood of 1.0 to 2.0 mg a day. Infants and children require approximately 0.05 per kilogram of body weight. The requirement for copper is approximately one-tenth of that for iron.

The requirement for *vitamin K* is usually satisfied by any good diet.

Nutritive Values of Average Servings of Common Foods *

Nutritive Values

Nutritive values in the following table are calculated on the basis of the edible portion of fresh, uncooked food, unless otherwise stated. Values for food listed as purchased (A.P.) were calculated from data for the edible portion (E.P.).

Vitamin Values

The values for vitamins A and D are stated in terms of International Units when possible; vitamin C content is stated in terms of milligrams, and riboflavin and thiamin (B_1) content in terms of micrograms. In a few instances where quantitative data are not available but the food is known to contain the vitamin, + signs are used; + means the vitamin is present, ++ the food is a good source, and +++ the food is an excellent source of the vitamin. Blank spaces indicate that data are lacking or insufficient.

The vitamin values given are averages which apply to foods that are reasonably fresh and of good quality. †

Mineral Values

Mineral values are given in terms of percentage of the recommended allowances for the adult. Since the Committee did not suggest any allowance for phosphorus, Sherman's allowance of 1.32 grams per day has been used in the text.

A good diet for the adult should provide on the average 100 per cent of the recommended allowances. Since the allowances for children are different from those for adults, these percentages do not apply for them and the information in grams should be used.

* The following table is compiled from various sources. Rose, *Laboratory Handbook for Dietetics,* 4th Ed., and Munsell, Vitamins and their occurrence in foods, *Milbank Memorial Fund Quarterly,* Vol. 18, pp. 311–344, 1940, have been used most extensively. Refer to these sources for foods not listed in the accompanying tables. The table is reproduced here by courtesy of the Foods and Nutrition Department, Cornell University.

† Values for processed foods will be found in Booher, Hartzler, and Hewston, U. S. Dept. Agr. Circular 638, *A Compilation of the Vitamin Values of Foods in Relation to Processing and Other Variants,* 1942.

Nutritive Values of Nuts, Seeds, Cereals, and Sweets

Food	Servings				Pro.	Fat	Carb.	Calcium	Iron	Ca	Fe	Vitamins			
	Approx. measure	grams	oz	cal	grams (approx.)			grams	grams	% daily allowance		A	Thiamin (B_1)	C	Ribo-flavin
												I.U.	*mcg*	*mg*	*mcg*
Nuts, shelled															
Almonds	12–15 nuts	15	0.5	100	3	8	3	0.0378	0.000585	5	5	11	34		90
Peanuts	20–24 nuts	18	0.6	100	5	7	4	0.01206	0.000360	2	3	0	32–49		135
Peanut butter	1 tbsp	17	0.6	100	5	8	3	0.01224	0.000306	2	3	+	56	0	102
Pecans	6–12 meats	14	0.5	100	1	10	2	0.01246	0.000364	2	3	56	147		42
Walnuts, English	8–16 nuts	14	0.5	100	3	9	2	0.01246	0.0003	2	3	14	63		
Seeds, dried															
Beans, lima, dried	⅙ cup	23	1.0	100	5	0	19	0.020	0.00245	3	20	28	152	0	252
navy	⅛ cup (scant)	29	1.0	100	7	1	17	0.0429	0.00290	5	24	0	148	0	
baked, canned	⅖ cup	100	3.5	129	7	3	20	0.042	0.00284	5	24	15	135		
Whole cereals															
Bread, 100% whole wheat	1 medium slice	28	1.0	75	3	0	15	0.02044	0.000476	3	4		84	0	25
Cornmeal, yellow whole-grain	3 tbsp	28	1.0	100	3	1	21	0.00448	0.000252	1	2	154	84	0	
Oatmeal, uncooked	4 tbsp	25	0.9	100	4	2	17	0.01625	0.00120	2	10	+	135	0	26
Rice, brown	2 tbsp	29	1.0	100	2	0	23	0.01885	0.000580	2	5		65	0	44
Shredded wheat	1 biscuit	27	1.0	100	3	0	21	0.012	0.00123	2	10		146		28
Whole-wheat flour	¼ cup	28	1.0	100	4	1	20	0.0098	0.000980	1	8		134		
Refined cereals															
Bread, white (milk)	1 medium slice	29	1.0	75	3	0	15	0.01827	0.000230	2	2		17	0	
enriched	1 medium slice	29	1.0	75	3	0	15	0.016	0.00024	2	2*		65–129		49–98
Cornstarch	3 tbsp	28	1.0	100	0	0	25	0	0	0	0				
Macaroni	¼ cup, 1″ pieces	28	1.0	100	4	0	21	0.00616	0.000336	1	3	0	3	0	
Rice, polished	2 tbsp	28	1.0	100	2	0	23	0.00308	0.000252	0	2	0	8	0	
Wheat flour, white	¼ cup	28	1.0	100	3	0	21	0.00443	0.000280	1	2	0	25	0	
Flour, enriched	¼ cup	28	1.0	100	3	0	21	0	0.00036	0	3*		103–155		73–112
Sweets															
Corn syrup, dark	1⅓ tbsp	29	1.0	100			25	0.0162	0.00363	2	31				
Honey	1⅓ tbsp	31	1.1	100	0	0	25	0.00124	0.000219	0	2	0		0	
Jelly, fruit	1⅓ tbsp	25	0.9	78	0	0	19								
Maple syrup	1½ tbsp	35	1.2	100	0	0	25	0.03745	0.001050	5	9	0			
Molasses, cane	1½ tbsp	35	1.2	100	1	0	24	0.09030	0.002555	11	21	0		0	
Sugar, brown	3 tbsp	26	0.9	100	0	0	25	0.02262	0.00068	3	6	0		0	
white	2 tbsp	25	0.9	100	0	0	25	0	0	0	0				

* Minimum standards effective Jan. 1, 1942. Enriched bread and flour may contain 1.5 times as much vitamin B and riboflavin and 4 times as much iron as indicated, as well as other added ingredients.

Nutritive Values of Dairy Products and Fats

Food	Servings				Pro.	Fat	Carb.	Calcium	Iron	Ca	Fe	Vitamins				
	Approx. measure	grams	oz	cal	grams (approx.)			grams	grams	% daily allowance		A	Thiamin (B_1)	C	D	Riboflavin
												I.U.	*mcg*	*mg*	*I.U.*	*mcg*
Milk and milk products																
Butter	1 tbsp	13	0.5	100	0	11	0	0.00208	0.00003	0	0	312			10	
Buttermilk	1 cup	241	8.5	84	9	1	10	0.25305	0.000723	32	6	7	43			231
Cheese, American	1 1⅛″ cube	23	0.8	100	7	8	0	0.21390	0.0003	27	3	460	10			173
American Dry	1 tbsp grated	8	0.3	33	2	3	0	0.064	0.00024	9	2					
cottage, skim	5 tbsp	91	3.2	100	19	2	4	0.07462		9	0	455				
soft cream	2 tbsp	29	0.9	100	3	10	0	0.10527	0.000435	13	4	609		0		52
Cream, 18.5%	¼ cup (scant)	51	1.8	100	1	10	2	0.04947	0.000102	6	1	306	15			
18.5%	1 cup	240	8.4	470	6	44	11	0.2328	0.000480	29	4	1,440	72			
32%	1 cup	238	8.4	743	6	76	8	0.208	0.00047	26	4	2,284	114			
40%	1⅔ tbsp	26	0.9	100	1	10	1	0.02236	0.000052	3	0	312	16			
40%	1 cup	221	7.8	842	5	88	7	0.190	0.000442	24	4	2,652	133			
Ice cream, vanilla	½ cup	100	3.5	179	2	14	16	0.082	0.0002	10	2	590	12	1		66
Milk, whole	1 cup	244	8.5	170	8	10	12	0.288	0.00049	36	4	268	146	2	5	549
skim	1 cup	241	8.5	88	8	1	12	0.29402	0.000723	37	6	5	108			+++
dried, whole	3 tbsp (1 cup, reconstituted)	20	0.7	100	5	6	8	0.181	0.000300	23	3	175	72			300
condensed	1½ tbsp	30	1.1	100	2	3	16	0.090	0.00018	11	2	233	7			
evaporated	4½ tbsp	71	2.5	100	5	6	7	0.22436	0.000497	28	4	433	28			285
malted	3 tbsp	25	0.9	100	3	2	18	0.03925	0.000525	11	4	158	85			188
dried, skim	3 tbsp (1 cup, reconstituted)	20	0.7	100	8	0	10	0.2448	0.00060	31	5	4	72			360
Fats																
Cod-liver Oil	1 tsp	4	0.1	33	0	4	0	0	0	0	0	3,400*	0	0	340*	0
Lard	1 tbsp (scant)	11	0.4	100	0	11	0	0	0	0	0	0	0	0	0	0
Margarines, unfortified	1 tbsp	13	0.5	100	0	11	0	0	0	0	0	18†	0	0		0
Olive oil	1 tbsp	11	0.4	100	0	11	0	0	0	0	0	0	0	0		0
Halibut-liver oil	¼ tsp	1		8	0	1	0	0	0	0	0	5,000*	0	0	540*	0

* Minimum values as stated in *New and Non-Official Remedies*, 1941. See label on package for content of individual brands.

† Margarines vary in vitamin A content with the fats used. Some margarines have 9000 I.U. of vitamin A per pound added. Consult the label.

Nutritive Values of Meats, Fish, and Eggs

Food	Servings				Pro.	Fat	Carb.	Calcium	Iron	Ca	Fe	Vitamins				
	Approx. measure	grams	oz	cal	grams (approx.)			grams	grams	% daily allowance		A	Thiamin (B_1)	C	D	Ribo-flavin
												I.U.	*mcg*	*mg*	*I.U.*	*mcg*
Meats																
Bacon, cooked	3 medium slices	14	0.5	100	3	10	0	0.00182	0.000490	0	4	3	11–34	0		
uncooked	1 medium slice	16	0.6	100	2	10	0	0.00083	0.00021	0	2	4		0		19
Chicken, boned	¼ cup	42	1.5	96	12	6	0	0.00462	0.001092	1	9		Dk 63, Lt 21			
Ham, boiled (lean only)	2 slices 4" × 4" × 3/32"	65	2.3	138	14	8	0	0.01105	0.001690	1	14	+	521–911			
smoked, lean	1 slice 4" × 2½" × 9/16"	100	3.5	266	20	21	0	0.0230	0.001400	3	12	+	801–1401			
Heart, beef		100	3.5	248	15	21	0	0.0090	0.00231	1	19		600			900
Kidneys, veal	½ kidney, 4¾" long	100	3.5	125	17	6	0	0.010	0.004100	1	34	1,000	180			2,100
Lamb chops, broiled	E.P. of 1 chop	65	2.3	231	14	19	0	0.00845	0.002145	1	18		156			137
Lamb leg, roast	Slice 3½" × 4½" × ⅓"	51	1.8	100	10	7	0	0.00561	0.000816	1	7		122			107
Liver, beef	1 slice 5" × 2½" × ¼"	100	3.5	129	20	5	2	0.0110	0.008200	1	68	9,000	225	38†	45	1,800
calf	1 slice 5" × 2½" × ¼"	100	3.5	137	18	5	3	0.0115	0.00545	1	45	7,000	210	33†	15	1,650
Pork chop, loin E.P.	1 medium serving	100	3.5	250	20	19	0	0.010	0.00150	1	13		1,200			225
Round steak, lean E.P.	1 slice 2½" × 2½" × ⅓"	100	3.5	156	21	8	0	0.01300	0.00300	2	25	50	120			225
Veal leg, roast	1 slice 2" × 2¾" × ⅛"	65	2.3	100	13	6	0	0.00845	0.00234	1	20		+			293
Fish																
Crab meat, canned	¾ cup	126	4.4	100	20	2	1	0.022	0.00113	3	9		+			
Halibut steak, fresh A.P.	½" × 2" × 7"	150	5.3	182	28	8	0	0.0120	0.001500	2	13		135			
Oysters	5–6 medium, ⅓ cup solids	80	2.8	40	5	1	3	0.0448	0.004640	6	39	112				
Salmon, red, canned *	½ cup	100	3.5	133	20	8	0	0 0660	0.00130	8	11	325			800	225
Salmon, fresh, A.P.	6" × ¾" × 1¾"	150	5.3	305	23	13	0	0 01500	0.00135	2	11	750	171			
Sardines, canned	4, 3" long	37	1.3	100	9	7	0	0.01295	0.000666	2	6	++	11		+++	
Shrimp, canned without oil A.P.	7 shrimps or ⅔ cup	90	3.2	100	23	1	0	0.08640	0.001260	11	11					
Tuna fish, canned without oil	½ cup	100	3.5	124	22	4	0	0.0240	0.00120	3	10			0		
Eggs																
Egg white	1 medium	32	1.2	16	4	0	0	0.00416	0.000032	1	0			0		96
Egg yolk	1 medium	18	0.6	64	3	5	0	0.02340	0.00155	3	13	500	75	0	‡	62
Egg, whole E.P.	1 medium	50	1.8	80	7	5	0	0.02756	0.00158	4	13	500	75	0	‡	165

* Includes small bones which are edible.

† Liver from freshly slaughtered animal.

‡ Vitamin D in eggs may be little or much depending upon the outdoor sunning and food of the hen.

Nutritive Values of Fruits

Food	Servings				Pro.	Fat	Carb.	Calcium	Iron	Ca	Fe	Vitamins			
	Approx. measure	grams	oz	cal	grams (approx.)			grams	grams	% daily allowance		A	Thiamin (B_1)	C	Riboflavin
												I.U.	*mcg*	*mg*	*mcg*
Apples, A.P.	1 medium	170	6.0	80	1	1	18	0.01360	0.00068	2	6	128	77	9	51
Apricots (D) * A.P.	9 halves	36	1.3	100	2	0	23	0.02340	0.002736	3	23	1,800	32	1	38
Bananas, A.P.	1 medium	156	5.5	100	1	1	22	0.01248	0.000936	2	8	300	45	10	90
E.P.	1 medium	100	3.5	100	1	1	22	0.01248	0.000936	2	8	300	45	10	90
Blackberries	⅞ cup	100	3.5	62	1	1	12	0.0320	0.000900	4	8	150	45	7	
Cantaloupe, A.P.	½ melon, 5″ diam.	385	13.6	50	1	0	10	0.06545	0.001540	8	13	450	90	45	90
E.P.	½ cup	100	3.5	27	1	0	6	0.017	0.0004	2	3	300	60	30	60
Cranberries	1 cup	100	3.5	47	0	1	10	0.0120	0.00040	2	3	28			
Dates, stoned	3–4	29	1.0	100	1	1	23	0.02059	0.001044	3	9	44	22		13
Figs (D)	2 medium	32	1.1	100	1	0	24	0.05152	0.000928	6	8	19	21		24
Grapefruit, A.P.	½ medium	286	10.0	100	2	1	20	0.06006	0.000858	8	7	0	131	81	
E.P.	½ cup	100	3.5	47	1	0	10	0.021	0.0003	3	3	0	69	43	
Grapefruit juice	⅖ cup	100	3.5	40	0	0	10	0.0270	0.000200	3	2	0	75	45	
Grapes	20 grapes	100	3.5	78	1	1	15	0.0190	0.00070	2	6		45	3	24
Grape juice, Concord	½ cup	100	3.5	70	0	0	17	0.0110	0.00030	1	3			2	
Lemon juice	2 tbsp	26	1.0	10	0	0	3	0.00598	0.000156	1	1	0	8	12	
Orange	1 medium	150	5.3	75	1	0	16	0.0390	0.000800	5	7	450–600	117	24–147	
Orange juice	⅖ cup	100	3.5	55	1	0	13	0.01900	0.000200	2	2	45–350	90	45	15
Peaches, yellow, A.P.	1 medium	111	3.9	50	1	0	12	0.01110	0.000333	1	3	1,000	30	10	60
yellow, E.P.	1 medium	100	3.5	51	1	0	12	0.0111	0.000333	1	3	1,000	30	10	60
Pears	1 small	100	3.5	63	1	1	14	0.0140	0.000300	2	3	10	45	3	60
Pears (C) *	2 halves and 2 tbsp juice	100	3.5	76	0	0	18	0.0090	0.000200	1	2	4–9	24		
Pineapple	1 slice, ½″ thick	100	3.5	57	0	0	14	0.0080	0.000400	1	3	90	75	25	36
Pineapple (C), 40% syrup	1½ slices and 2 tbsp. juice	100	3.5	96	0	0	23	0.0050	0.000200	1	2	100	60		
Pineapple juice, unsw. (C)	⅖ cup	100	3.5	67	0	0	17	0.0160	0.000100	2	1		75	15	
Plums, A.P.	2 plums, 1½″ diam.	100	3.5	46	1	0	11	0.0200	0.000600	3	5		105	5	45
Prunes (D), A.P.	4 medium	39	1.4	100	1	0	24	0.02262	0.001131	3	9	975	59	1	
Raisins	¼ cup seeded	29	1.0	100	1	1	22	0.01740	0.000870	2	7	15	26		
Rhubarb	1 cup 1″ pieces	100	3.5	18	1	0	4	0.0440	0.00060	6†	5			20	
Strawberries	½ cup	100	3.5	39	1	1	7	0.0340	0.00070	4	6			50	
Tomato	1 small, 2″ diam.	100	3.5	21	1	0	4	0.0100	0.00040	1	3	1,100	78	23	60
Tomatoes (C)	½ cup	100	3.5	21	1	0	4	0.0100	0.00040	1	3	1,100	78	13–39	60
Tomato juice (C)	½ cup (scant)	100	3.5	24	1	0	5	0.0060	0.00060	1	5			19	
Watermelon, E.P.	½ cup	100	3.5	30	0	0	7	0.008	0.0002	1	2		60	8	30

* D = dried; C = canned. † Not available because of oxalic acid content.

Nutritive Values of Vegetables

Food	Servings				Pro.	Fat	Carb.	Calcium	Iron	Ca	Fe	Vitamins			
	Approx. measure	grams	oz	cal	grams (approx.)			grams	grams	% daily allowance		A	Thiamin (B_1)	C	Riboflavin
												I.U.	*mcg*	*mg*	*mcg*
Asparagus	5 large stalks, 7½″ long	100	3.5	26	2	0	4	0.0210	0.00100	3	8	700	210	35	120
Beans, string	1 cup 1″ pieces	100	3.5	42	2	0	7	0.0550	0.00120	7	10	1,000	75	15	120
Beets	2 medium	100	3.5	46	2	0	10	0.0280	0.00090	4	8	0	45	5	30
Beet greens	½ cup steamed	100	3.5	33	2	0	6	0.0940	0.00320	12†	27	+++		50	450
Broccoli	2–4 stalks, 6″ long	100	3.5	37	3	0	6	0.140	0.00140	18	12	9,000	111	70	225
Brussels sprouts	5–6 sprouts	100	3.5	58	4	1	8	0.0270	0.00120	3	10	200	180	75	
Cabbage, new	¾ cup chopped	75	2.6	24	1	0	4	0.0337	0.00030	4	3	75	56	45	68
Chinese		50	1.8	8	1	0	1	0.0255	0.00050	3	4	1,000	38	20	23
Carrots	2 young; 3–4″ long	100	3.5	45	1	0	9	0.0460	0.00060	6	5	2,100	60	5	60
Cauliflower	¾ cup	100	3.5	31	2	0	5	0.1220	0.00090	15	8	30	150	75	105
Celery, bleached stems	⅘ cup ¼″ pieces	100	3.5	20	1	0	3	0.0780	0.00060	10	5	10	30	5	35
Chard, Swiss	⅓ cup cooked	100	3.5	25	1	0	4	0.1000	0.00310	13†	26	9,000		38	90
Corn (C) *	⅓ cup	100	3.5	98	3	1	19	0.0060	0.00050	1	4			5	
Corn, green	2 ears, 6″ long	255	9.0	100	3	1	19	0.0153	0.00127	2	11	1,275	344	26	153
Cucumbers	4 slices ¼″ thick, 2″ diam.	60	2.1	8	0	0	2	0.0060	0.00018	1	2	12	27	6	14
Dandelion greens	¾ cup steamed	100	3.5	52	3	1	9	0.0840	0.00310	11	26	12,000		100	
Eggplant	2 slices 4″ diam. × ⅜″	100	3.5	28	1	0	5	0.0110	0.00050	1	4	35	45	10	30
Kale	1 cup cooked	100	3.5	44	3	1	8	0.1810	0.00250	23	21	20,000	150	125	600
Lettuce, Iceberg	3–4 leaves or ¾ cup shredded	50	1.8	9	1	0	1	0.0085	0.00025	1	2	50	38	7	23
Mustard greens	¾ cup steamed	100	3.5	31	3	0	5	0.2200	0.00560	28	47	+++	135	125	
Onions	2 medium	100	3.5	49	2	0	10	0.0410	0.00050	5	4	0	30	8	90
Parsnips	½ parsnip, 7″ long	100	3.5	65	2	1	14	0.0600	0.00080	8	7		120	23	
Peas, green	¾ cup	100	3.5	100	7	1	17	0.0230	0.00210	3	18	1,000	420	25	195
Peas (C) *	⅝ cup	100	3.5	47	4	0	10	0.0110	0.00240	1	20	250–1,500	195		
Peppers, green, sweet	1 medium pepper	70	2.5	20	1	0	4	0.0084	0.00028	1	2	3,500	21	88	84
Potato	1 medium	120	4.2	100	3	0	22	0.0144	0.00108	2	9	36	144	16	54
Potato, sweet, yellow	1 medium	150	5.3	185	3	1	41	0.0300	0.00120	4	10	5,250	135	30	135
Rutabagas	⅔ cup ½″ cubes	100	3.5	41	1	0	9	0.0740	0.00050	9	4	1,750	45	20	
Spinach	½ cup cooked	100	3.5	24	2	0	3	0.0770	0.00260	10†	22	25,000	120	75	375
Squash, winter	½ cup cooked	100	3.5	43	2	0	9	0.0190	0.00060	2	5	4,000	45	5	75
summer	½ cup steamed	100	3.5	19	1	0	4	0.0180	0.00040	2	3	1,000	45		45
Turnips, white	¾ cup ½″ cubes	100	3.5	35	1	0	7	0.0600	0.00050	8	4	0	36	30	36
Turnip greens	½ cup	100	3.5	37	3	0	5	0.3470	0.00350	43	29	10,000	120	150	360

* C = canned. † Not available because of oxalic acid content.

Nutritive Values of Miscellaneous Cooked Foods

Food	Servings				Pro.	Fat	Carb.	Calcium	Iron	Ca	Fe	Vitamins *			
	Approx. measure	grams	oz	cal	grams (approx.)			grams	grams	% daily allowance		A	Thiamin (B_1)	C	Riboflavin
Miscellaneous cooked foods												*I.U.*	*mcg*	*mg*	*mcg*
Cake, angel food	piece 1¼″ × 2″ × 2½″	36	1.3	100	3	0	22								
butter—2 egg	piece 2″ × 2¼″ × 1″	129	4.6	100	2	4	14	0.009	0.0002	1	2		2		
sponge—6 egg	piece 1½″ × 1½″ × 2″	25	0.9	100	3	2	18	0.014	0.0006	2	5		5		
Cocoa (½ milk—½ water)	1 cup	252	9.0	161	6	7	19	0.151	0.0004	19	3	191	6		
Cookies, plain vanilla	1 cookie, 2¼″ diam.	14	0.5	50	1	2	8								
Gelatin, lemon	½ cup	109	3.8	100	2		23							7	
Gingerbread, sour milk	1 piece 4″ × 2″ × 1⅛″	63	2.2	200	4	2	36	0.090	0.0018	11	15	65	18		27
Mayonnaise	1 tbsp	14	0.5	100		11			0.0001		1	35	4		8
Oatmeal (cooked)	¾ cup (¼ cup or 25 grams uncooked)	136	4.8	100	4	2	17	0.016	0.0012	2	10	+	135		26
Pie crust	3½″ sector—single crust	17	0.6	75	1	5	7								
Salad—mixed greens with French dressing	1 salad, ½ cup, 1 tsp dressing	75	2.6	50	1	4	2	0.014	0.0006	2	5	1,300	88	15	72
Tomato soup, cream of	1 cup	244	8.7	269	8	18	18	0.234	0.0011	29	9		30		225
Vegetable soup (made with meat stock)	1 cup	255	9.1	112	2	3	19	0.047	0.0014	6	12	494	3		

Pro. = protein; Carb. = carbohydrate; Ca = calcium; Fe = iron; cal = calories.

* Few studies have been made on cooked foods. The vitamin content before cooking may be calculated from the values for individual ingredients, but, when food is cooked, some of the values change.

A new publication, "Vitamin Values of Foods in Terms of Common Measures," Publ. 505, was published after this book went to press. It can be obtained from the United States Department of Agriculture.

Selection and Care of Bottles and Nipples

Selection

In buying baby bottles and nipples the mother should try, if possible, to buy enough bottles and nipples so that baby can have one for each feeding and one for water.

In selecting bottles be sure that every part of the bottle can be reached easily with a bottle brush in washing. Some bottles have small necks and round out so suddenly from the neck that they almost form an angle and are almost impossible to clean. Others graduate more slowly from a larger neck, making it possible to reach every spot with the brush. The bottles with the straight sides, large opening, and large nipples to fit, are desirable. The bottles should be of good glass, preferably Pyrex. Pyrex bottles cost more originally but do not break as easily. Bottles should be capable of repeated boiling and should hold 8 to 10 ounces each.

The nipples should be of pliable rubber easily turned inside out and with a hole that lets fluid come out drop by drop without stopping, but does not flow when the bottle is inverted.

Care

It is advisable with new bottles of ordinary glass to wash and anneal them by covering with cold water, bringing the water to a boil, letting them boil for 20 minutes, and then cooling in this same water before using them. This prevents cracking when hot fluid is poured into them. New nipples should be inverted, washed, and boiled before using.

After each feeding the bottle should be rinsed immediately with cold water and let stand, filled with water, until it is washed. Before using again, bottles should be well washed with soap or soda and water, rinsed, and inverted in the wire rack if one has one.

After it is used, each nipple should immediately be washed inside and out with soap and water, rinsed, and kept in a clean jar. When bottles are sterilized, nipples should also be boiled and dropped into a sterile jar and kept dry and covered until time for use.

Two large-mouthed Mason jars will also be sterilized with the bottles, one to keep nipples in and one for sterile water.

Sterilizing

While the formula is being made, the rack with bottles and two Mason jars should have water added, brought slowly to the boiling point, and allowed to boil 5 minutes.

Care of Formula

After the formula has been prepared, each sterilized bottle should be filled with the necessary amount for each feeding, and covered. Sterile paper caps, rubber caps, or wax paper and rubber bands can be used for this purpose. The filled, stoppered bottles are kept in the refrigerator or cold place until time for feeding. If it is impossible to keep fresh milk cold, it is advisable to use some other form such as dried milk, making up the formula at each feeding time.

Reheating and Testing

At feeding time one bottle is brought out, the nipple is put on and the bottle set in a pan of warm water and heated slowly on a low burner until the formula is warm. When a drop of formula is dropped upon the inside of the wrist, it should feel warm but not hot. If the bottle is other than a Pyrex bottle, it will need to stand upon a rack, a pie tin, or a clean cloth in the bottom of the pan before being heated, to prevent glass from breaking.

Sugars

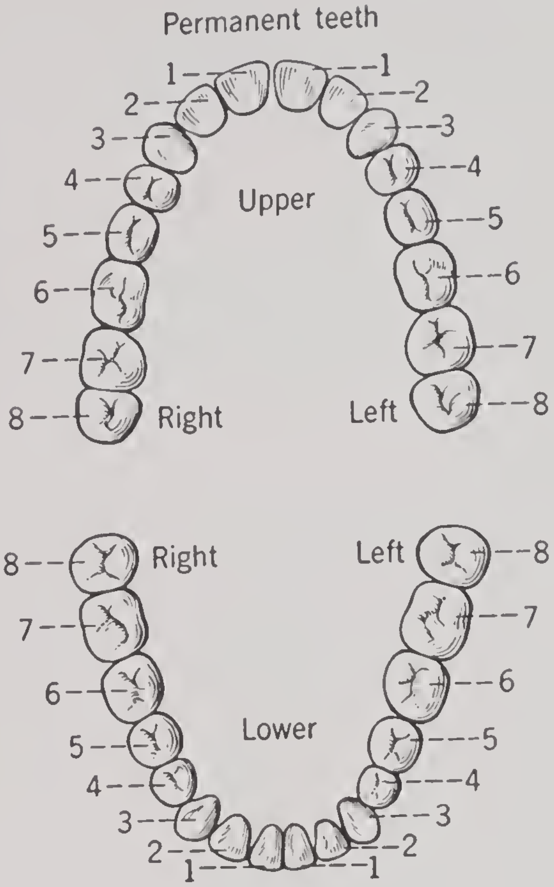
Tablespoon Equivalent of 1 Ounce

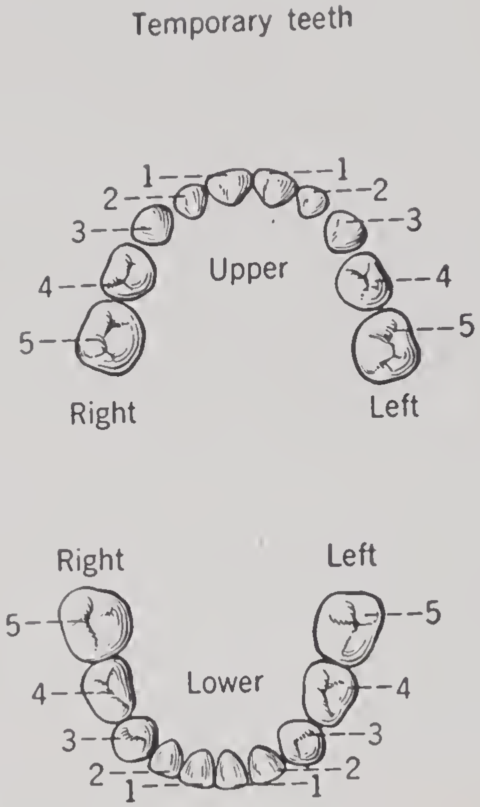
The four sugars most commonly used in infant feeding are cane sugar, which is common granulated sugar or brown sugar; lactose or milk sugar; maltose or malt sugar; and Karo syrup (dark or light).

Each of these sugars gives approximately 120 calories per ounce. The ounce equivalents in tablespoons is:

2 level tablespoonfuls cane sugar = 1 ounce
1⅓ level tablespoonfuls Karo syrup = 1 ounce
3 level tablespoonfuls brown sugar = 1 ounce
3 level tablespoonfuls milk sugar = 1 ounce
4 level tablespoonfuls Dextri-maltose = 1 ounce

* * * * *





USUAL AGE OF ERUPTION OF TEMPORARY OR "BABY" TEETH

	Lower	*Upper*
1. Central incisor	6–8 months	8–12 months
2. Lateral incisor	12–16 months	8–12 months
3. Canine (eye tooth)	18–20 months	18–20 months
4. First molar ..	12–16 months	12–16 months
5. Second molar	24–32 months	24–32 months

USUAL AGE OF ERUPTION OF PERMANENT TEETH

	Boys		Girls	
	Lower	*Upper*	*Lower*	*Upper*
1. Central incisor	6 yr 4 mo	7 yr 2 mo	6 yr 1 mo	7 yr 0 mo
2. Lateral incisor	7 yr 6 mo	8 yr 8 mo	7 yr 2 mo	7 yr 11 mo
3. Cuspid or canine	10 yr 5 mo	11 yr 6 mo	9 yr 10 mo	10 yr 10 mo
4. First bicuspid	10 yr 10 mo	10 yr 5 mo	10 yr 2 mo	10 yr 2 mo
5. Second bicuspid	11 yr 4 mo	10 yr 10 mo	10 yr 11 mo	10 yr 10 mo
6. First molar	5 yr 11 mo	6 yr 1 mo	5 yr 11 mo	6 yr 0 mo
7. Second molar	12 yr 6 mo	12 yr 11 mo	11 yr 5 mo	12 yr 2 mo
8. Third molar	(wisdom teeth) extremely variable—17–25 yr			

From Goodenough and Anderson in *Your Child Year by Year.* Courtesy of the publishers, Parents' Institute, Inc.

The following sections on fontanels, sleep, urine, and blood are taken from J. H. Hess, *Feeding and the Nutritional Disorders in Infancy and Childhood,* and are used by the courtesy of F. A. Davis Publishing Co.

Closure of Fontanels

Posterior fontanel usually closes by the end of the second month. Anterior fontanel at the end of the first year is about 1 inch in diameter, and usually closes at the eighteenth month. Normal variations, from fourteen to twenty-two months.

Sleep

The healthy newborn infant sleeps practically all the time except when being fed.

	Hours per Day
At birth	20–22
At end of 1st year	16–18
During 2d and 3d years	12–13
During 4th and 5th years	10–11
During 12th and 13th years	8–9

Average Daily Quantity of Urine Voided in Health

	Ounces
1st 24 hours	0–2
2d 24 hours	⅓–3
3 to 6 days	3–8
7 days to 2 months	5–13
2 to 6 months	7–16
6 months to 2 years	8–20
2 to 5 years	16–26
5 to 8 years	20–40
8 to 18 years	32–48

Blood-Picture in Healthy Children

	Newborn	*Infants*	*Older children*
Hemoglobin	110 per cent	70 to 95 per cent	65 to 95 per cent
Erythrocytes	5 to 8 millions	4.5 to 5.5 millions	4 to 4.5 millions

Average Annual Increase in Weight and Height *

	Boys		Girls	
	Pounds	Inches	Pounds	Inches
0 month to 1 year	14.0	9.0	13.5	8.5
1 year to 2 years	6.0	4.0	6.0	4.0
2 years to 3 years	5.0	3.5	5.0	3.5
3 years to 4 years	4.0	3.0	4.0	3.0
4 years to 5 years	4.0	2.5	4.0	2.5
5 years to 6 years	4.0	2.0	4.0	2.0
6 years to 7 years	4.0	2.0	4.0	2.0
7 years to 8 years	4.75	2.0	4.5	2.0
8 years to 9 years	5.25	2.0	5.0	1.75
9 years to 10 years	6.0	2.0	5.25	2.25
10 years to 11 years	5.0	1.7	6.5	2.0
11 years to 12 years	6.5	1.8	9.5	2.5
12 years to 13 years	8.0	2.0	10.5	2.0
13 years to 14 years	10.0	2.5	9.5	2.0
14 years to 15 years	12.5	2.7	7.5	1.25
15 years to 16 years	13.75	2.7	6.0	0.75
16 years to 17 years	6.5	1.2	3.5	0.50
17 years to 18 years	5.0	0.5	0.5	0.20

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* The three weight and height tables are from L. Emmett Holt, *Diseases of Infancy and Childhood* p. 23 1922. Courtesy of Appleton-Century Co.

Average Net Weight, Height, and Circumference of Head and Chest of Healthy Children from Birth to Four Years

Age	Sex	Weight		Height		Chest		Head	
		pounds	*kilos*	*inches*	*cm*	*inches*	*cm*	*inches*	*cm*
Birth	Boys	7.55	3.43	20.6	52.5	13.4	34.2	13.9	35.2
	Girls	7.16	3.26	20.5	52.0	13.0	33.0	13.5	34.3
6 months	Boys	16.0	7.26	26.5	67.4	16.5	41.9	17.0	43.2
	Girls	15.5	7.03	26.0	66.1	16.1	40.8	16.6	42.3
12 months	Boys	21.0	9.54	29.5	75.0	18.0	45.7	18.0	45.7
	Girls	20.5	9.31	29.0	73.7	17.5	44.5	17.5	44.5
18 months	Boys	24.5	11.13	31.5	80.0	18.7	47.8	18.6	47.5
	Girls	23.7	10.77	31.0	78.8	18.2	46.2	18.0	45.7
2 years	Boys	27.0	12.27	33.5	85.1	19.3	49.1	19.2	48.7
	Girls	26.0	11.81	33.0	83.8	18.8	48.0	18.6	47.5
2½ years	Boys	29.7	13.50	35.5	90.2	19.8	50.4	19.5	49.5
	Girls	28.7	13.04	35.0	89.0	19.3	49.1	19.0	48.2
3 years	Boys	32.0	14.54	37.0	94.0	20.3	51.5	19.8	50.4
	Girls	31.0	14.09	36.5	92.8	19.8	50.4	19.4	49.3
4 years	Boys	36.8	16.72	40.5	103.0	20.8	52.8	20.0	50.8
	Girls	35.3	16.04	40.0	101.6	20.3	51.6	19.7	50.2

Average Relation of Weight to Height

(Weights in House Clothes; Heights without Shoes)

Boys				Girls			
Height	Weight	Increase per Inch	Approx. Age	Height	Weight	Increase per Inch	Approx. Age
inches	*pounds*	*pounds*	*years*	*inches*	*pounds*	*pounds*	*years*
33	28.0		2	33	27.0		2
34	29.3	1.3		34	28.3	1.3	
35	30.6	1.3		35	29.6	1.3	
36	32.0	1.4		36	30.9	1.3	
37	33.5	1.5	3	37	32.3	1.4	3
38	35.0	1.5		38	33.7	1.4	
39	36.5	1.5		39	35.2	1.5	
40	38.2	1.7	4	40	36.8	1.6	4
41	40.0	1.8		41	38.6	1.8	
42	42.0	2.0	5	42	40.4	1.8	5
43	44.0	2.0		43	42.2	1.8	
44	46.0	2.0	6	44	44.0	1.8	6
45	48.0	2.0		45	46.0	2.0	

Weight–Height–Age Table for Boys *

Height, inches	5 yr	6 yr	7 yr	8 yr	9 yr	10 yr	11 yr	12 yr	13 yr	14 yr	15 yr	16 yr	17 yr	18 yr	19 yr
38	34	34													
39	35	35													
40	36	36													
41	38	38	38												
42	39	39	39	39											
43	41	41	41	41											
44	44	44	44	44											
45	46	46	46	46	46										
46	47	48	48	48	48										
47	49	50	50	50	50	50									
48		52	53	53	53	53									
49		55	55	55	55	55	55								
50		57	58	58	58	58	58	58							
51			61	61	61	61	61	61							
52			63	64	64	64	64	64	64						
53			66	67	67	67	67	68	68						
54				70	70	70	70	71	71	72					
55				72	72	73	73	74	74	74					
56				75	76	77	77	77	78	78	80				
57					79	80	81	81	82	83	83				
58					83	84	84	85	85	86	87				
59						87	88	89	89	90	90	90			
60						91	92	92	93	94	95	96			
61							95	96	97	99	100	103	106		
62							100	101	102	103	104	107	111	116	
63							105	106	107	108	110	113	118	123	127
64								109	111	113	115	117	121	126	130
65								114	117	118	120	122	127	131	134
66									119	122	125	128	132	136	139
67									124	128	130	134	136	139	142
68										134	134	137	141	143	147
69										137	139	143	146	149	152
70										143	144	145	148	151	155
71										148	150	151	152	154	159
72											153	155	156	158	163
73											157	160	162	164	167
74											160	164	168	170	171

* Prepared by Bird T. Baldwin and Thomas D. Wood. Courtesy of The American Child Health Association, New York.

When taking measurements, remove the child's outdoor clothing, shoes, and coat. Take heights with

Weight–Height–Age Table for Girls *

Height, inches	5 yr	6 yr	7 yr	8 yr	9 yr	10 yr	11 yr	12 yr	13 yr	14 yr	15 yr	16 yr	17 yr	18 yr
38	33	33												
39	34	34												
40	36	36	36											
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66									124	124	125	128	129	130
67									128	130	131	133	133	135
68									131	133	135	136	138	138
69										135	137	138	140	142
70										136	138	140	142	144
71										138	140	142	144	145

a square, consisting of two flat pieces of wood joined at right angles (a chalk box will serve). The child is placed in a good erect position, with heels and shoulders against the wall or wide board, upon which has been marked or pasted an accurate measure. Age is taken to the nearest birthday.

Total Food Allowances (Calories) for Children of about Average Weight for Their Age *

AGE	TOTAL CALORIES PER DAY (24 HOURS)
Birth to 1 year	350– 950
1 to 2 years	800–1,200
2 to 3 years	1,000–1,300
3 to 4 years	1,050–1,400
4 to 5 years	1,150–1,500
5 to 6 years	1,200–1,600
6 to 7 years	1,450–1,900
7 to 8 years	1,500–2,100
8 to 9 years	1,600–2,300
9 to 10 years	1,800–2,500
10 to 11 years	1,900–2,700
11 to 12 years	2,000–2,800
12 to 13 years	2,100–3,000
13 to 14 years	2,300–3,500
14 to 15 years	2,400–3,800
15 to 16 years	2,400–4,000
16 to 17 years	2,250–4,000
17 to 18 years	2,250–4,000
Adult †	2,600–3,300

* Based on Gillett's *Food Allowances for Healthy Children*, Rose's *Laboratory Handbook for Dietetics* and Chapin and Royster's *Pediatrics.*

† Adult is average male 150 pounds, female 130 pounds, doing moderate amount of exercise.

The requirement of the adult is given here for comparison, so that a mother of a one-year-old, for instance, might say, "Well, at most, I might expect my average child to take less than one-half as much food as I take, and at 13 years of age he may need more even than his father." On the other hand parents must remember that these requirements here given are for average-sized children. If your child is taller than the average he may need more calories than here given for his age; or if your child is below weight for his height (see tables p. 370) and you would like him to put on more weight, you will try to give him more calories even though you may have to feed him four or five meals a day to get them in.

If a father is doing very active work he may need decidedly more calories. Thus, according to Tigerstedt,

A shoemaker needs 2,000 to 2,400 calories a day.
A weaver needs 2,400 to 2,700 calories a day.
A carpenter or mason needs 2,700 to 3,200 calories a day.
A farm laborer needs 3,200 to 4,100 calories a day.
An excavator needs 4,100 to 5,000 calories a day.
A lumberman needs over 5,000 calories a day.

Material Taken from New York State Department of Health and the Department of Education Regarding Communicable Diseases

Disease and Incubation Period	Common Early Signs and Symptoms	Method of Infection	Isolation of Patient	Remarks	School Observation Period *
Chickenpox Incubation Period: 11–24 days Usually 13–16 days	In children the first symptom usually noticed is the rash which probably at that time consists of small blisters that have developed from small pimples. In a day or two crusts form which fall off in about 14 days. The eruption comes out in crops so that there may be pimples, blisters, and scabs all within a small area of the skin.	Contact with a previous case. Infection believed to be contained in discharges from nose and throat and the skin lesions.	Until recovery.	Very contagious. A mild disease and seldom any after-effects. Important because of possible confusion with smallpox. The long and variable period of incubation and mildness of the disease do not warrant quarantine even of susceptible contacts.	For 22 days from last day of contact.
Diphtheria Incubation Period: Minimum, less than 1 day Maximum, indefinite Usually 2–5 days	Sore throat is usually the first symptom in patients over a year old. In very young children it is likely to be croup. In the latter there may be no patches showing, but in the former they can always be found in "typical" cases on the throat itself, the tonsils, or the palate—sometimes on all of them. Some cases look like simple tonsilitis. In nasal cases discharge from the nose occurs, which usually excoriates the upper lip and may be bloody. Diphtheritic croup simply means diphtheria of the larynx. It is an exceedingly dangerous form of the disease.	Contact with a previous case or carrier. Discharges from nose and throat contain infection. Milk may convey infection. Often spread through milk, unrecognized cases, or by persons harboring the germs of the disease though giving no evidence of having had an attack of diphtheria (carriers).	Until two successive cultures, each from throat and nose at least 24 hours apart, the first taken not less than one week from date of onset, contain no diphtheria bacilli; if diphtheria bacilli are present after 5 weeks from date of taking first release culture, case may be considered a carrier.	Very dangerous, both during attack and from after-effects. When diphtheria occurs in a school all children suffering from sore throat should be excluded and the health officer notified of their names and addresses. There is great variation of type, and mild cases are often not recognized unless a culture is taken or subsequent paralysis develops. Cases regarded as ordinary "sore throat" often start epidemics. Tonsilitis cases should have a certificate before returning to school. *Children may be made immune against diphtheria by toxoid. Ask the medical inspector or the health officer for further information about it.*	For 7 days from last day of contact.
German Measles Incubation Period: 12–21 days Usually 14–18 days	Illness usually slight. Onset sudden. Lymph nodes in back of neck usually enlarged. Rash often first thing noticed. Cold in head not a prominent symptom. May have fever, sore throat, and the eyes may be inflamed. Rash variable; may resemble measles or scarlet fever, or both.	Contact with a previous case. Discharges from nose and mouth of a patient convey infection.	No. But exclusion from school required by Sec. 575 of Education Law.	A mild disease. Reporting required because frequently confused with scarlet fever. The long and variable period of incubation and the mildness of the disease do not warrant quarantine even of susceptible contacts.	For 21 days from last day of contact.

Measles Incubation Period: 5(?)–18 days Usually 9–12 days	Begins with fever followed by symptoms like cold in the head, with running nose, sneezing, inflamed and watery eyes, and fever. The rash is usually first seen behind the ears, on forehead and face. It is blotchy and usually dusky red in color. The rash usually appears on the third or fourth day but may occur on the first or as late as seventh day.	Contact with a previous case. Discharges from nose and mouth of a patient, especially in the early days of the disease before the rash appears, convey infection.	Until recovery.	Very contagious especially during the first few days before the rash appears. Practically every one who has not had disease is susceptible. Because of these facts measles occurs characteristically in epidemics. Efforts to cut these epidemics short through the quarantine of contacts are seldom successful and cause much inconvenience and loss of school time. The primary object should be the prevention of deaths through adequate medical and nursing care. Parents should be instructed in early symptoms and told to keep the child home if they develop. If found in school the child should be sent home and the health officer notified of name and address. Measles is very dangerous to children less than 3 years old. School children nearly always recover unless they are in poor physical condition or are not properly cared for during illness.	For 18 days from last day of contact.
Meningococcus Meningitis Incubation Period: 1–5 days, possibly longer	Onset usually abrupt, with vomiting, fever, headache and stiffness of neck.	Contact with a previous case or carrier. Discharges from nose and mouth of a patient or carrier convey infection.	Until two weeks after temperature has become normal.	Cultures require special apparatus and technique.	For 7 days from last day of contact.
Poliomyelitis (Infantile Paralysis) Incubation Period: 5–21 days Usually 8–10 days	Onset sudden, fever, dull pain on bending neck forward, pain on being handled, headache, vomiting. Sometimes sudden development of weakness of one or more muscle groups.	Virus present in nose and throat secretions and feces of cases, of abortive cases, and probably of carriers. Milk apparently has conveyed infection but uncommon.	Until 14 days after date of onset.	Disease is probably most communicable in the early stages. After-effect usually paralysis of certain muscle groups, transitory or permanent. Death is due usually to paralysis of respiratory muscles.	For 21 days from last day of contact.

Material Taken from New York State Department of Health and the Department of Education Regarding Communicable Diseases—(Continued)

Disease and Incubation Period	Common Early Signs and Symptoms	Method of Infection	Isolation of Patient	Remarks	School Observation Period *
Scarlet Fever Incubation Period: 1–7 days Usually 2–5 days	Onset usually sudden, with headache, fever, sore throat, and often vomiting. Glands (lymph nodes) of neck usually enlarged. Usually within 24 hours the rash appears as fine, evenly diffused bright-red dots. The rash is seen first on the neck and upper part of chest, and lasts 24 hours to 10 days, when it fades and the skin peels in scales, flakes, or even large pieces. May have sore throat without rash (so-called "scarlatina sore throat").	Contact with a previous case or carrier. Discharges from nose and mouth, suppurating glands, or ears of a patient. Milk may convey infection. Often spreads through mild, unrecognized cases.	Until 21 days from onset and until discharges have ceased; not more than 90 days.	Dangerous both during attack and from after-effects. Running ears and discharging noses or suppurating glands greatly prolong the infectious period. Great variation in type of disease. Slight attacks may be as infectious as severe ones. Many mild cases not diagnosed and many concealed. Second attacks occur occasionally. When scarlet fever occurs in a school, all cases of sore throat should be sent home and health officer notified. Most fatal in children under 10 years.	*School contacts*—To be observed for 7 days from last day of contact. *Household contacts*—Excluded from school and isolated 7 days under supervision of Health Department.
Septic Sore Throat Incubation Period: 1–3 days	Begins with sore throat, fever, and weakness. Throat diffusely reddened and may show patches like diphtheria.	Infection most often disseminated through raw milk from a cow with udder infected from human source. Discharges from nose and mouth of a patient.	Until recovery.	Often leads to serious results, affections of glands, heart, kidneys, etc. Very likely to occur in epidemics due to milk that has been contaminated by a patient suffering from the disease or to a cow infected by a patient.	For 7 days from last day of contact.
Smallpox Incubation Period: 5–21 days Usually 10–14 days	Onset sudden, usually with fever and severe backache. About third day usually upon subsidence of constitutional symptoms there develop red pimples, felt below the skin, and seen first about the face and wrists and most on exposed surfaces. They form small blisters and after two days more become filled with yellowish matter. Scabs form which begin to fall off about the fourteenth day. In mild cases the pimples and blisters may closely resemble those found in chickenpox.	Contact with a previous case. Discharges from nose and mouth, and contents of pustules are believed to convey infection.	Until 14 days after onset and until skin has healed.	Very contagious. Cases of modified smallpox may be and often are so slight as to escape detection. Existence of disease may be concealed. A severe illness may result from exposure to a mild case.	See footnote †. While complying with requirement of daily observation by health officer in † below, individual may attend school.

Whooping Cough Incubation Period: 2–14 days Usually 5–8 days	Begins with cough which is worse at night. Symptoms may at first be very mild. Characteristic "whooping" develops in about 2 weeks, and the spasm of coughing sometimes ends with vomiting. If a child vomits after a hard spell of coughing, he probably has whooping cough.	Contact with a previous case. Discharges from nose and mouth especially in the early stages before the whoop begins.	Patient restricted from associating with children or attending public assemblies until 1 week after last characteristic cough, but not more than 8 weeks.	After-effects often very severe, and disease causes great debility. Relapses are likely to occur. Second attack rare. Specially infectious for first week or two before the "whoop" occurs. Great variation in type of disease. Often fatal in young children and the weak and aged. Nearly half the deaths are in children less than a year old, and 95 per cent are in children under 5 years of age.	For 14 days from last day of contact.

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* All school children who recently have been close contacts of the patient and are presumably not immune (but have ceased all contact with the patient) shall report for observation each school day for the period indicated before admission to any class.

† *Quarantine of Smallpox Contacts* if

1. Contact does not reside or continue to reside on same premises as the patient and either
2. Is successfully vaccinated within 3 days of first exposure or
3. Presents evidence satisfactory to the health officer of *previous* successful vaccination or of a previous attack of smallpox *and* upon revaccination shows either an immune or accelerated reaction. He may be released from quarantine after the faccinia reaction has reached its height, but must be observed daily by the health officer until 3 weeks after last exposure.

Otherwise contact must remain under quarantine until 3 weeks after last exposure.

The following communicable diseases are not reportable to the health officer but require the exclusion of the patient from school:

1. Mumps cases excluded for 5 days after disappearance of all swelling.
2. Non-immune contacts who have ceased all contact with patient with mumps shall report daily for observation for 22 days from last day of contact.

Children with acute conjunctivitis, impetigo, colds, sore throat, scabies, lice, or ringworm shall be excluded from school until, in the opinion of the school physician, there is no longer danger of transmission of infection or infestation to others.

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